
STATE OF CALIFORNIA

STANDARD PLANS

for Construction of Local Streets and Roads

JULY 2002

Issued by: CALIFORNIA DEPARTMENT OF TRANSPORTATION

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FOR CONSTRUCTION OF LOCAL STREETS AND ROADS

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Foreword

These “Standard Plans for Construction of Local Streets and Roads” contain units in two systems of measurement. Units shown in the International System of Units (SI or “metric”) are the standards established by the California Department of Transportation. Units in the United States Standard Measures are shown in parentheses “()”. The Department does not warrant the accuracy of the units shown in United States Standard Measures, and any use of United States Standard Measures is at the sole risk of those agencies and others that specify United States Standard Measures units in their contracts. The measurements expressed in the two systems are not necessarily equal, and items constructed or fabricated in one system are not necessarily interchangeable with items constructed or fabricated in the other system. The project Special Provisions designate the system of units that will apply.

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AB	aggregate base
ABBC	asbestos bonded bituminous coated
ABM	air-blown mortar
Abn	abandon
Abut	abutment
AC	asphalt concrete
ACB	asphalt concrete base
ACP	asbestos cement pipe
AFES	alternative flared end section
Ahd	ahead
Adj	adjust
Alt	alternate
AP	alternative pipe
APC	alternative pipe culvert
APU	alternative pipe underdrain
AS	aggregate subbase
ASRP	aluminum spiral rib pipe
Assy	assembly
ATPB	asphalt treated permeable base
ATPM	asphalt treated permeable material
Ave	avenue

B	beginning of bridge
BC	begin horizontal curve
BCR	begin curb return
Beg	begin
Bit Ctd	bituminous coated
Bk	back
Bkf	backfill
Bldg	building
Blvd	boulevard
BM	bench mark
Br	bridge
BVC	begin vertical curve
BW	barbed wire

CAA	cable anchor assembly
CAP	corrugated aluminum pipe
CAPA	corrugated aluminum pipe arch
CAS	construction area sign
C-C	center to center
CF	cubic foot
Chnl	channel
CIDH	cast-in-drilled-hole
CIP	cast iron pipe
CIPCP	cast-in-place concrete pipe
CL	centerline
CL	chain link
Cl	class
Clr	clear, clearance
Co	county
Col	column
Conc	concrete
Cond	conduit
Conn	connector
Const	construct (ion)
Coord	coordinate
Cr	creek
CRSP	concreted rock slope protection
CSP	corrugated steel pipe
CSPA	corrugated steel pipe arch
CTB	cement treated base

CTPB	cement treated permeable base
CTPM	cement treated permeable material
Culv	culvert
CY	cubic yard

D	depth
Dbi	double
DD	downdrain
Del	delineator
Det	detour or detail
DF	Douglas Fir
DI	drainage inlet
Dia	diameter
Dist	distance
DMBB	double metal beam barrier
Dr	drive
DTBB	double thrie beam barrier
Dwy	driveway

E	each
Ease	easement
EB	end of bridge or eastbound
EC	end horizontal curve
ECR	end curb return
ED	edge drain
EDC	edge drain cleanout
EDO	edge drain outlet
EDV	edge drain vent
Elev	elevation
Emb	embankment
EP	edge of pavement
Eq	equation
ES	edge of shoulder
ETW	edge of traveled way
EVC	end vertical curve
EW	endwall
Exc	excavation
Exlst	existing
Exp	expressway
Exp Jt	expansion joint

F & C	frame and cover
Fdn	foundation
FEBT	facing eastbound traffic
FNB	facing northbound traffic
FSBT	facing southbound traffic
FWBT	facing westbound traffic
FES	flared end section
FF	filter fabric
F & G	frame and grate
FG	finished grade
FH	fire hydrant
FL	flow line
Fr Rd	frontage road
Ftg	footing
Fwy	freeway

G	gage
Galv	galvanized
GP	grading plane
GR	guard railing

GSP	galvanized steel pipe
H	height
h	hour
HD	horizontal drain
Horiz	horizontal
HP	hinge point or horse power
HS	high strength
HW	headwall
Hwy	highway

I	imported borrow
ID	inside diameter
Inv	invert
Irr	irrigation
J	joint pole
JP	junction structure
JS	joint
Jt	joint

K	kilometer post
----------	----------------

L	length, liter
lb	pound
LCB	lean concrete base
Loc	location
LF	linear foot
LOL	layout line
Ln	lane
LS	lump sum
Lt	left

M	maximum
MB	metal beam
MBB	metal beam barrier
MBGR	metal beam guard railing
Med	median
MFBM	thousand foot board measure
MH	manhole
Mkr	marker
Min	minimum, minutes
Misc I&S	miscellaneous iron and steel
Misc	miscellaneous
Mod	modified or modify
Mon	monument
MP	metal plate
MPGR	metal plate guard railing
MR	movement rating
Mtl	material

N	northbound
NB	number
No.	nominal pipe size
NPS	nominal diameter
ø	

O	obliterate
Oblr	overcrossing
OC	outside diameter
OD	original ground
OG	open graded asphalt concrete
OGAC	overhead
OH	

P	perforated aluminum pipe
PAP	pull box
PB	point of curvature
PC	point of compound curve or portland cement concrete
PCC	perforated concrete pipe
PCP	point of compound vertical curve
PCVC	pedestrian
Ped	pedestrian overcrossing
Ped OC	pedestrian undercrossing
Ped UC	permeable material
Perm MH	profile grade
PG	point of intersection
PI	property line
P/L	plate
PL	post mile
PM	paving notch
POT	point on horizontal curve
POT	point on tangent
POVC	point on vertical curve
PP	power pole or plastic pipe
PPP	perforated plastic pipe
PPL	performed permeable liner
PRC	point of reverse curve
PRF	pavement reinforcing fabric
PRVC	point of reverse vertical curve
PSP	perforated steel pipe
PVC	polyvinyl chloride
Pvmt	pavement

R	radius
RCA	reinforced concrete arch
RCB	reinforced concrete box
RCP	reinforced concrete pipe
RCPA	reinforced concrete pipe arch
R & D	remove and dispose
Rd	road
Reinf	reinforced or reinforcing
Rel	relocate
Ret	retaining
RM	road-mixed
RP	reference point
RR	railroad
R & S	remove and salvage
RSP	rock slope protection
Rt	right
Rte	route
RW	retaining wall
R/W	right of way

S	structure approach
SAE	embankment
Salv	salvage

SAPP	structural aluminum plate pipe
SB	southbound
SC	sand cushion
SL	station line
SCSP	slotted corrugated steel pipe or sacked concrete slope protection
SD	storm drain
Sec	section
Sep	separation
SG	subgrade
SGD	subgrade drain
Shld	shoulder
Sht	sheet
SI	International System of Units
SM	selected material
Spec	special
SPP	slotted plastic pipe
SS	slope stake
SOFT	square foot
SOYD	square yard
SSBM	strap and saddle bracket method
SSD	structural section drain
SSPA	structural steel plate arch
SSPP	structural steel plate pipe
SSPPA	structural steel plate pipe arch
SSRP	steel spiral rib pipe
St	street
STA, Sta	station
STBB	single thrie beam barrier
Std	standard
Str	structure
Surf	surfacing
SW	sidewalk or sound wall
Swr	sewer

T	semi-tangent
TAB	tablet
TBB	thrie beam barrier
Tbr	timber
TC	top of curb
TCB	traffic control box
Temp	temporary
TG	top of grate
TP	telephone pole
TPB	treated permeable base
TPM	treated permeable material
Trans	transition
TS	traffic signal or tubular steel
Typ	typical
Typ Sec	typical section

U	undercrossing
UC	underdrain
UD	underpass
UP	

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
July 1, 2002 PLANS APPROVAL DATE					
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V	design speed or valve
Var	variable
VVC	vertical curve
VCP	vitrified clay pipe
Vert	vertical
Via	viaduct
W	width
WB	westbound
WH	weep hole
WM	wire mesh
WSP	welded steel pipe
WW	water valve
WW	wing wall

X	crossing
X Sec	cross section

SI PREFIXES		
PREFIX	SYMBOL	MULTIPLICATION FACTOR
milli-	m	10 ⁻³
kilo-	k	10 ³
mega-	M	10 ⁶
giga-	G	10 ⁹

METRIC UNITS (SI)	
SYMBOL	UNIT
mm	millimeter
m	meter
g	gram
s	second
A	ampere
°C	degrees Celsius
Hz	hertz
N	Newton
Pa	Pascal
l	liter
ha	hectare
W	Watt

ABBREVIATIONS AND ACRONYMS

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NO SCALE

A10A

EXISTING TOPOGRAPHIC LINES AND SYMBOLS

	Building		Orchard, Missing Tree, Interior Trees
	Foundation or Ruin		Tree
	Shoulder		Trees
	Surfaced Road with Lane Stripe		Ground Cover
	Curb without Gutter		Freeway Signs (Overhead)
	Curb with Gutter		Roadside Signs (New & Existing)
	Gravel or Dirt Road, Drives or Walks		Transmission Tower
	Trail		Fire Hydrant
	Railroad		Power Pole (New & Existing)
	Bridge		Utility Pole (New & Existing)
	Culvert and Headwalls		Stand Pipe, Flagpole, Pullbox, Windmill, Well, Crash Cushion, Valve Cover
	Fence and Gate		Aerial Photo Center
	Retaining Wall with Fence on Top		
	Wall		
	Median Barrier		
	Guard Rail		
	Small Stream or Ditch		
	Large Body of Water		
	Small Body of Water		

CONTROL POINTS

	Horizontal and Vertical Control Point
	Horizontal Control Point
	Vertical Control Point
	Bench Mark

NEW CONSTRUCTION AND CADASTRAL SYMBOLS

	Metric Units (SI)		Centerline
	Station Line		Layout Line
	Intermediate ticks @ 20 m intervals		US Standard Measures
	Centerline		Station Line
	Layout Line		Intermediate ticks @ +50' intervals
	Right of Way Line		Existing Wall
	Slope Line		New Wall
	Original Ground Line		Existing Guard Railing
	Boundary Line		New Guard Railing
	Concrete Barrier		Double Metal Beam Barrier, Double Thrie Beam Barrier
	Curb without Gutter		Curb with Gutter
	Fence		Ditch Flow Line
	Structure (Bridge)		Dike and Overside Drain
	UNDERGROUND UTILITIES		Pipe Culvert 900 mm (36") or less in diameter
	Water		Pipe Culvert, greater than 900 mm (36") in diameter
	Gas		Railroad
	Sewer		
	Electric		
	Telephone		
	Gasoline		
	Oil		
	Television		

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SYMBOLS

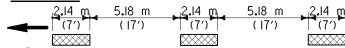
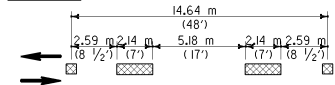
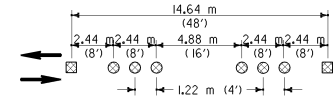
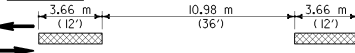
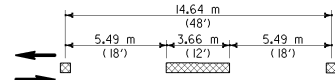
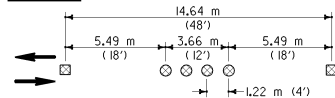
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NO SCALE

A10B

CENTERLINES

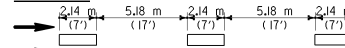
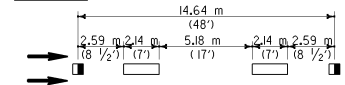
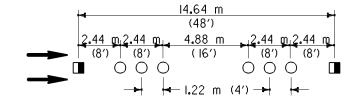
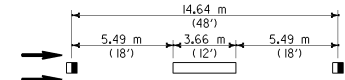
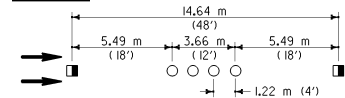
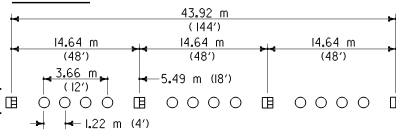
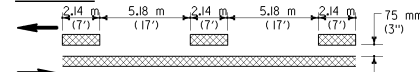
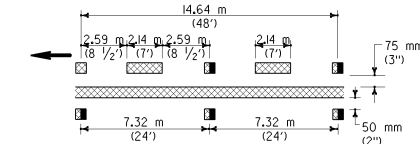
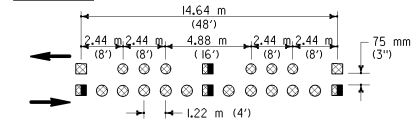
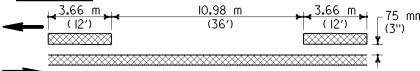
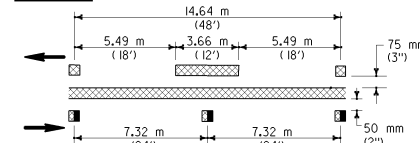
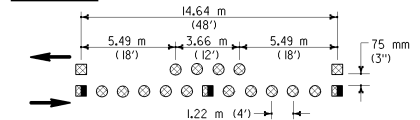
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DETAIL 1**DETAIL 2****DETAIL 4****DETAIL 5****DETAIL 6****DETAIL 7****NOTE**

Detail 3 deleted

LANELINES

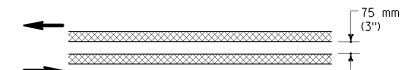
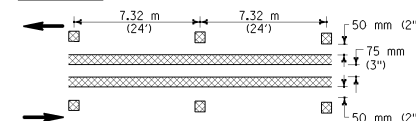
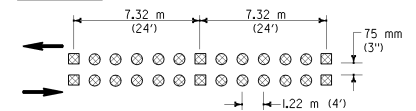
(MULTILANE HIGHWAYS)

DETAIL 8**DETAIL 9****DETAIL 10****DETAIL 11****DETAIL 12****DETAIL 13****DETAIL 14****NO PASSING ZONES-ONE DIRECTION****DETAIL 15****DETAIL 16****DETAIL 17****DETAIL 18****DETAIL 19****DETAIL 20**

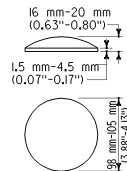
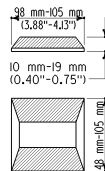
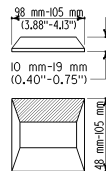
DIST	COUNTY	ROUTE	POST MILES	SHEET TOTAL
			TOTAL PROJECT	NO. SHEETS

Donald E. Howe
 REGISTERED CIVIL ENGINEER
 No. 46402
 Exp. 3-31-03
 DATE
 July 1, 2002
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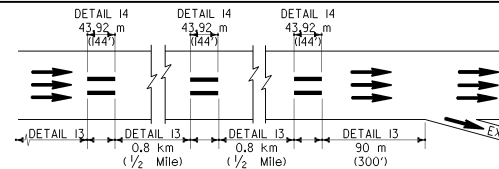
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NO PASSING ZONES - TWO DIRECTIONS**DETAIL 21****DETAIL 22****DETAIL 23****LEGEND**

- Direction of Travel
- MARKERS**
- TYPE A White Non-reflective
 - ⊗ TYPE AY Yellow Non-reflective
 - ⊞ TYPE C Red-clear Retroreflective
 - ⊞ TYPE D Two-way Yellow Retroreflective
 - ⊞ TYPE G One-way Clear Retroreflective
 - ⊞ TYPE H One-way Yellow Retroreflective
- LINES**
- 100 mm (4") White
 - 100 mm (4") Yellow

MARKER DETAILS**TYPE A & AY****TYPE C & D****TYPE G & H**

Retroreflective Face

TYPICAL LANE LINE DELINEATION IN ADVANCE OF EXIT RAMP

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PAVEMENT MARKERS AND TRAFFIC LINES TYPICAL DETAILS

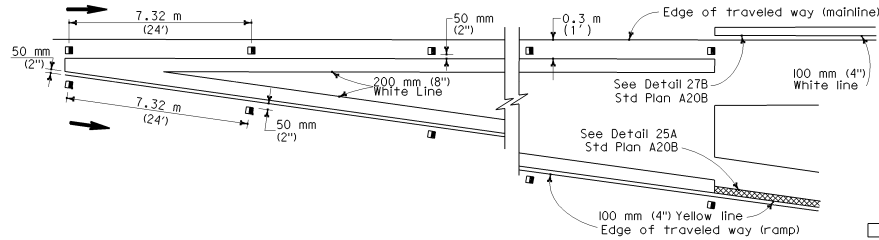
These "Standard Plans for Construction of Local Streets and Roads" contain units in two systems of measurement: International System of Units (SI or "metric") and United States Standard Measures shown in the parentheses ('). The measurements expressed in the two systems are not necessarily equal or interchangeable. See the "Foreword" at the beginning of this publication.

NO SCALE

A20A

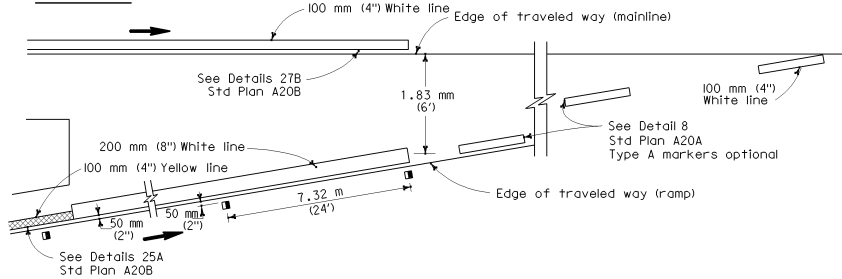
EXIT RAMP NEUTRAL AREA (GORE) TREATMENT

DETAIL 36



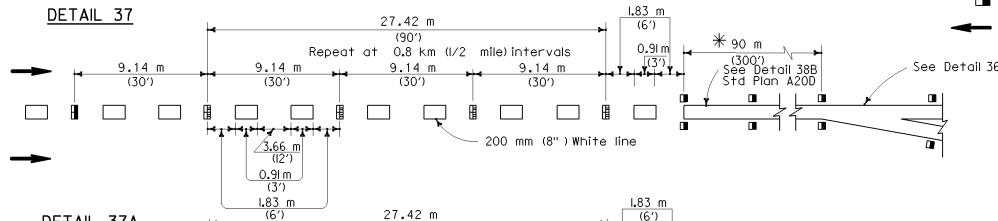
ENTRANCE RAMP NEUTRAL AREA (GORE) TREATMENT

DETAIL 36A

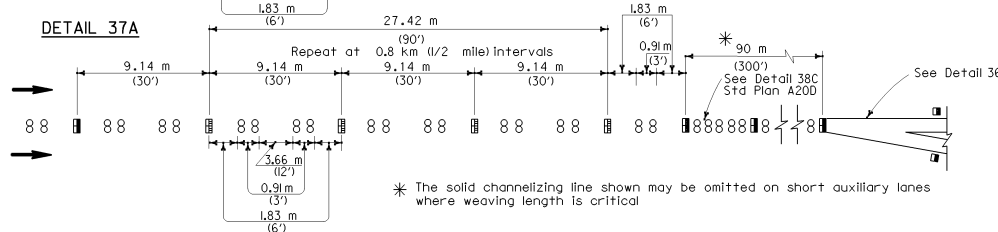


LANE DROP AT EXIT RAMP

DETAIL 37



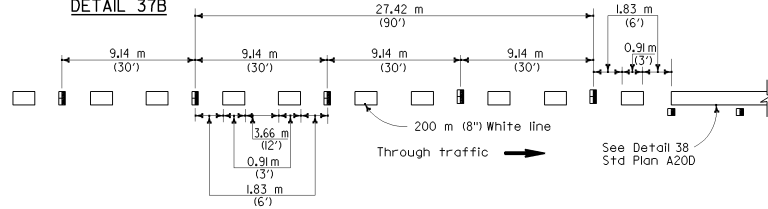
DETAIL 37A



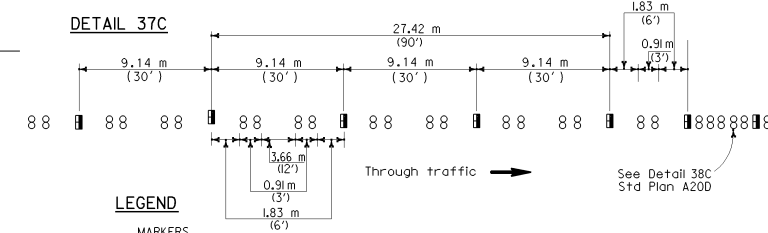
* The solid channelizing line shown may be omitted on short auxiliary lanes where weaving length is critical

LANE DROP AT INTERSECTIONS

DETAIL 37B



DETAIL 37C

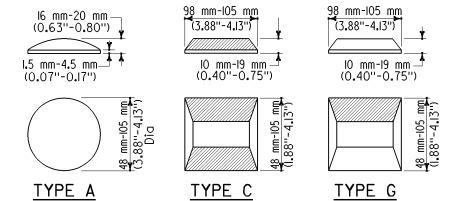


LEGEND

MARKERS

- TYPE A White Non-reflective
- ◻ TYPE C Red-clear Retroreflective
- ◻ TYPE G One-way Clear Retroreflective
- ← Direction of Travel

MARKER DETAILS



◻ Retroreflective Face

PAVEMENT MARKERS AND TRAFFIC LINES TYPICAL DETAILS

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NO SCALE

A20C

Return to Table of Contents

DIST	COUNTY	ROUTE	POST MILES	SHEET TOTAL
			TOTAL PROJECT	NO. SHEETS

REGISTERED CIVIL ENGINEER DATE
 July 1, 2002 PLANS APPROVAL DATE
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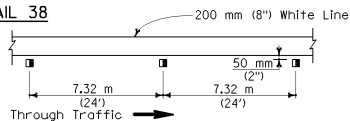
DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET TOTAL NO. SHEETS

Donald E. Howe
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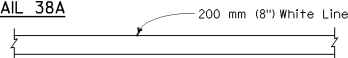
REGISTERED	PROFESSIONAL	NUMBER
Donald E. Howe	Exp. 3-31-03	Civil
STATE OF CALIFORNIA		

CHANNELIZING LINE

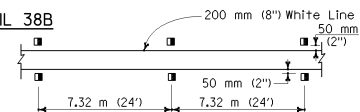
DETAIL 38



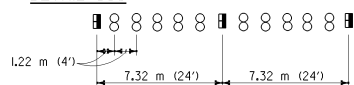
DETAIL 38A



DETAIL 38B

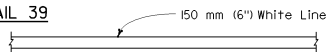


DETAIL 38C



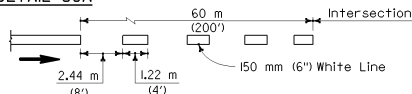
BIKE LANE LINE

DETAIL 39



INTERSECTION LINE BIKE LANE

DETAIL 39A



DETAIL 40



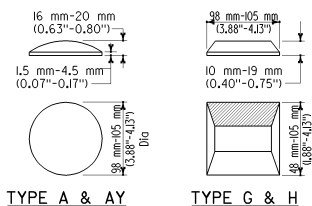
LANE LINE EXTENSIONS THROUGH INTERSECTIONS

LEGEND

MARKERS

- TYPE A White Non-reflective
 - TYPE G One-way Clear Retroreflective
- ← Direction of Travel

MARKER DETAILS

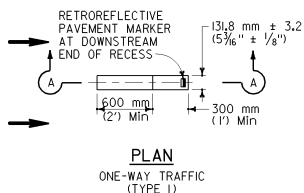
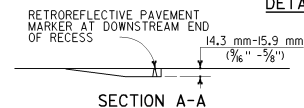


TYPE A & AY

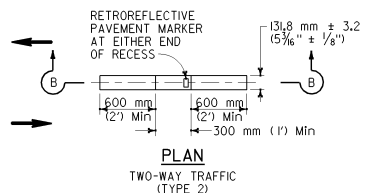
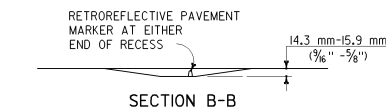
TYPE G & H

▨ Retroreflective Face

DETAIL 40

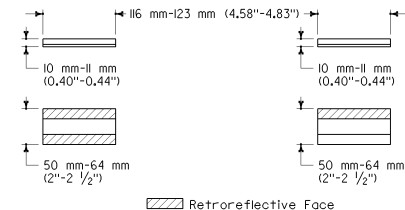


PLAN
ONE-WAY TRAFFIC
(TYPE 1)



PLAN
TWO-WAY TRAFFIC
(TYPE 2)

RECESS DETAIL FOR RETROREFLECTIVE PAVEMENT MARKER



▨ Retroreflective Face

TYPE C & TYPE D

TYPE G & TYPE H

RETROREFLECTIVE PAVEMENT MARKER FOR RECESSED INSTALLATION

SEE NOTES 1 AND 2.

RECESSED MARKER NOTES:

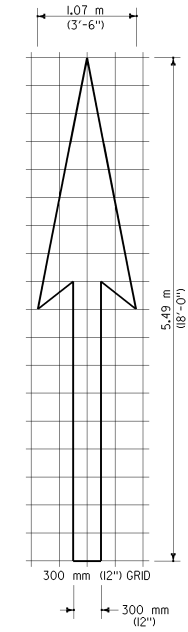
1. See typical traffic line details for marker patterns to be used with recessed pavement markers. Detail 14 requires a Type 2 recess.
2. The retroreflective pavement markers shown for recessed installations are not to be used for non-recessed installations.

PAVEMENT MARKERS AND TRAFFIC LINES TYPICAL DETAILS

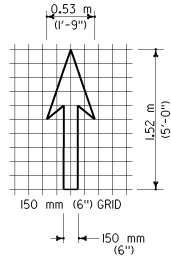
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NO SCALE

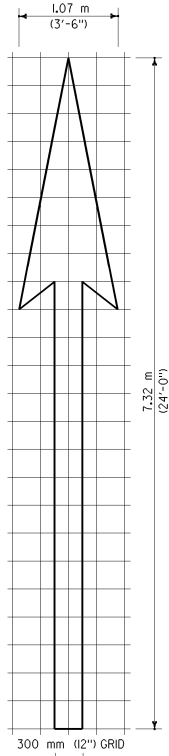
A20D



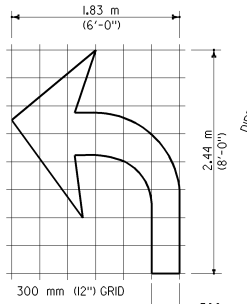
A=2.32 m² (25 SOFT)
TYPE I ARROW
 5.49 m (18'-0")



A=0.65 m² (7 SOFT)
BIKE LANE ARROW

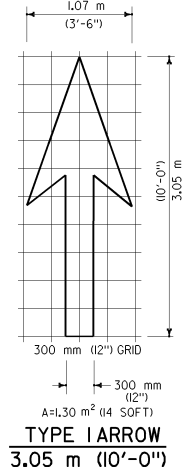


A=2.88 m² (31 SOFT)
TYPE I ARROW
 7.32 m (24'-0")

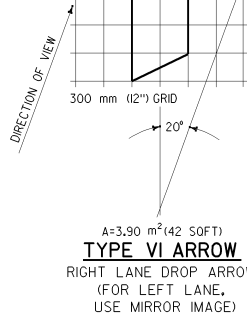


A=1.39 m² (15 SOFT)
TYPE IV (L) ARROW
 (FOR TYPE IV(R) ARROW, USE MIRROR IMAGE)

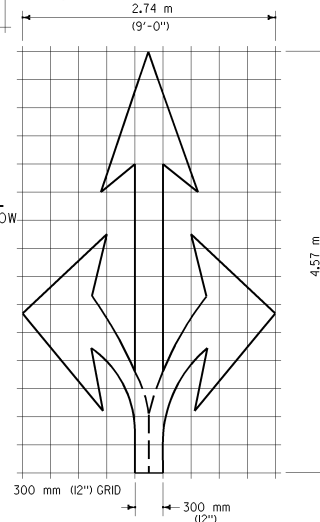
NOTE:
 MINOR VARIATIONS IN DIMENSIONS
 MAY BE ACCEPTED BY THE ENGINEER.



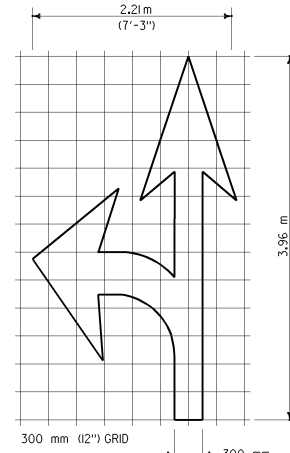
A=1.30 m² (14 SOFT)
TYPE I ARROW
 3.05 m (10'-0")



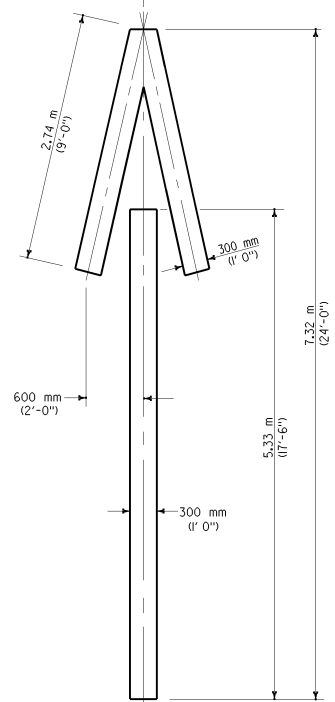
A=3.90 m² (42 SOFT)
TYPE VI ARROW
 RIGHT LANE DROP ARROW
 (FOR LEFT LANE, USE MIRROR IMAGE)



A=3.34 m² (36 SOFT)
TYPE VIII ARROW



A=2.51 m² (27 SOFT)
TYPE VII (L) ARROW
 (FOR TYPE VII (R) ARROW, USE MIRROR IMAGE)



A=3.06 m² (33 SOFT)
TYPE V ARROW

STATE OF CALIFORNIA
 DEPARTMENT OF TRANSPORTATION
**PAVEMENT MARKINGS
 ARROWS**

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NO SCALE

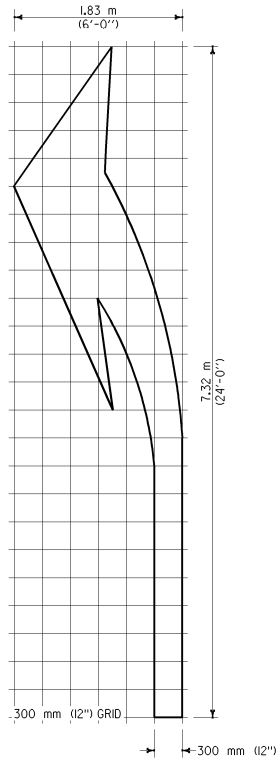
A24A

DIST.	COUNTY	ROUTE	POST MILES	SHEET TOTAL
			TOTAL PROJECT	NO. SHEETS

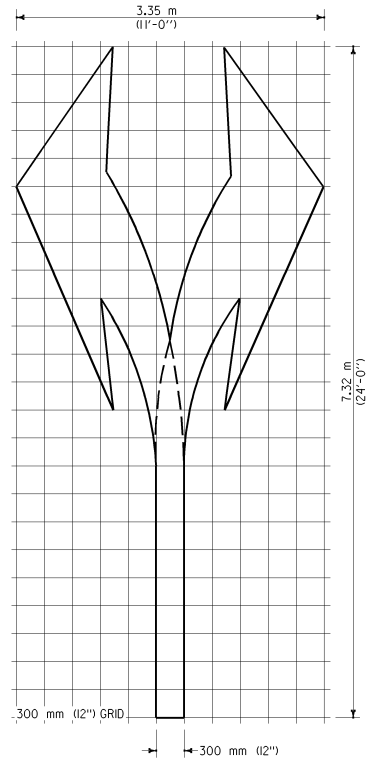
Registered Civil Engineer
 July 1, 2002
 PLANS APPROVAL DATE
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REGISTERED PROFESSIONAL ENGINEER
 Donald E. Howe
 No. 46402
 Exp. 3-31-03
 CIVIL
 STATE OF CALIFORNIA

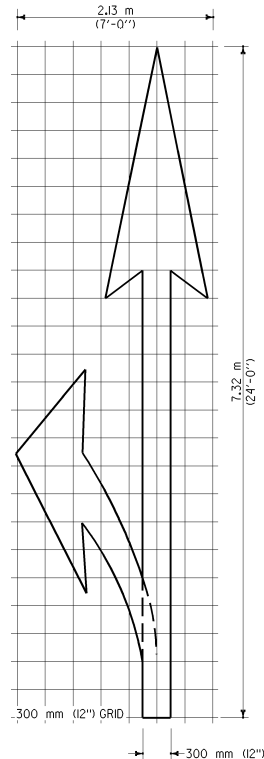
DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
 REGISTERED CIVIL ENGINEER			DATE		
July 1, 2002 PLANS APPROVAL DATE					
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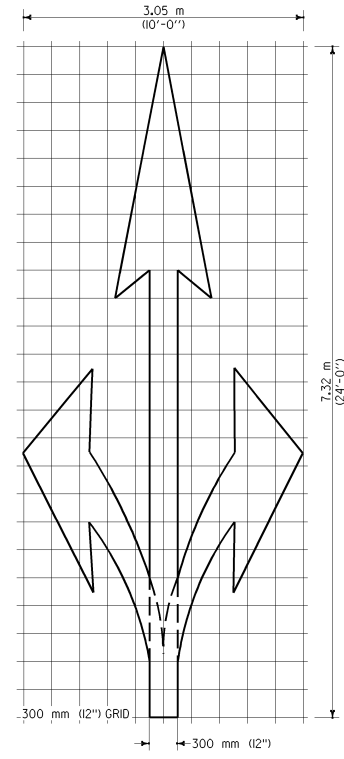
A=3.90 m² (42 SQFT)
TYPE III (L) ARROW
 FOR TYPE III (R) USE MIRROR IMAGE



A=6.78 m² (73 SQFT)
TYPE III (B) ARROW



A=4.18 m² (45 SQFT)
TYPE II (L) ARROW
 FOR TYPE II (R) USE MIRROR IMAGE



A=5.48 m² (59 SQFT)
TYPE II (B) ARROW

NOTE

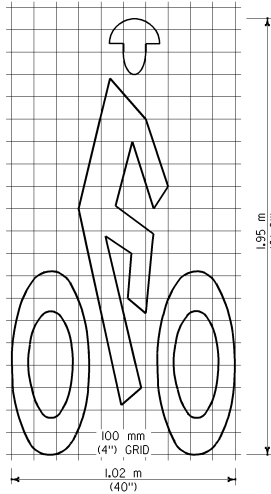
MINOR VARIATIONS IN DIMENSIONS
 MAY BE ACCEPTED BY THE ENGINEER.

STATE OF CALIFORNIA
 DEPARTMENT OF TRANSPORTATION
**PAVEMENT MARKINGS
 ARROWS**

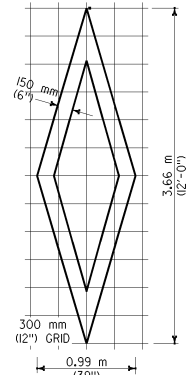
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NO SCALE

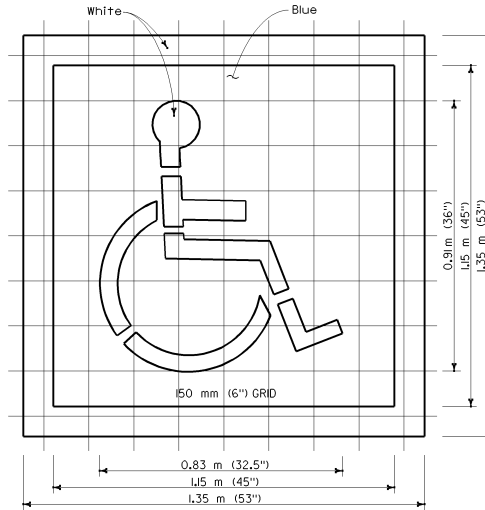
A24B



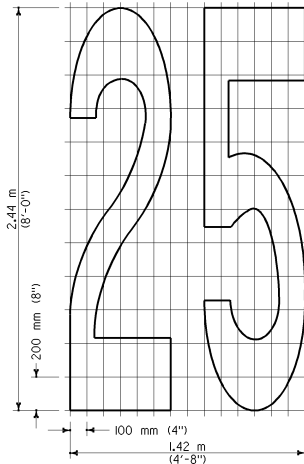
A=0.65 m² (7 SQFT)
BIKE LANE SYMBOL



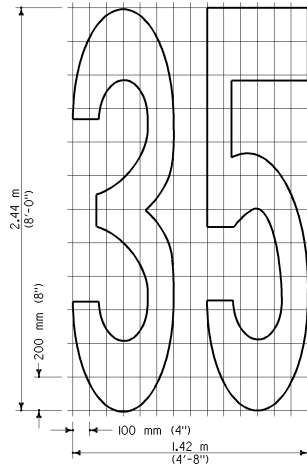
A=1.02 m² (11 SQFT)
DIAMOND SYMBOL



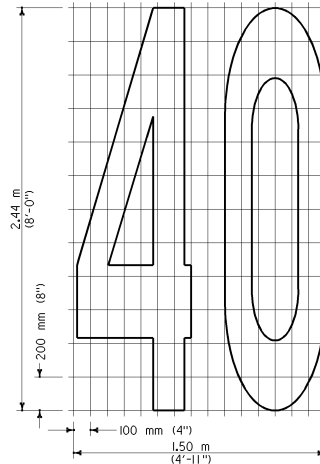
A (Blue) =1.32 m² (14 SQFT)
A (White) =0.82 m² (9 SQFT)
DISABLED PERSONS PARKING SYMBOL
See Note 2



A=1.63 m² (17.5 SQFT)

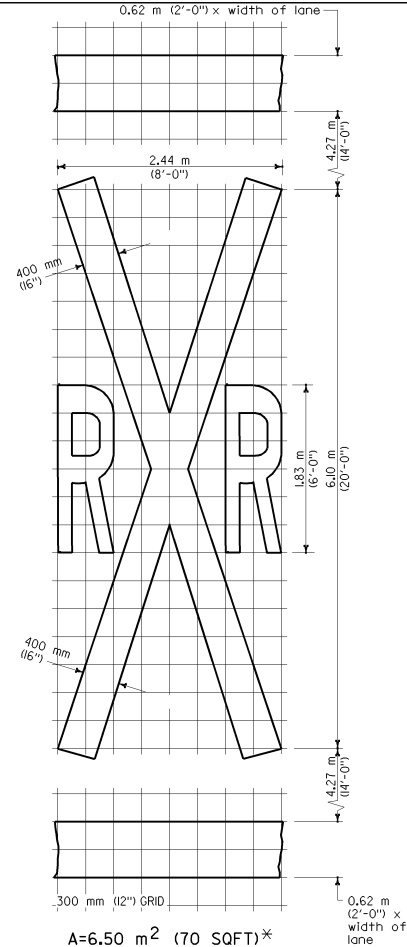


A=1.53 m² (16.5 SQFT)

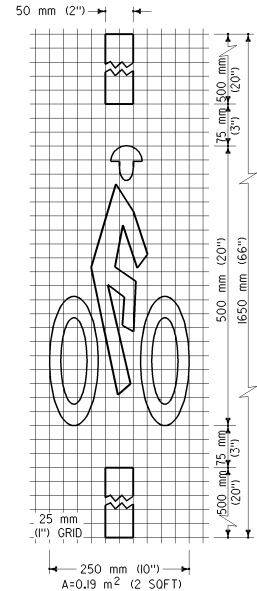


A=1.8 m² (19.5 SQFT)

NUMERALS



A=6.50 m² (70 SQFT)*
RAILROAD CROSSING SYMBOL
*6.5 m² (70 SQFT) DOES NOT INCLUDE THE
0.6 m (2'-0") x VARIABLE WIDTH TRANSVERSE LINES.



A=0.19 m² (2 SQFT)
**BICYCLE LOOP
DETECTOR SYMBOL**

NOTES

- Minor variations in dimensions may be accepted by the Engineer.
- This parking symbol is also known as the International Symbol of Accessibility (ISA)

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PAVEMENT MARKINGS SYMBOLS AND NUMERALS

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NO SCALE

A24C

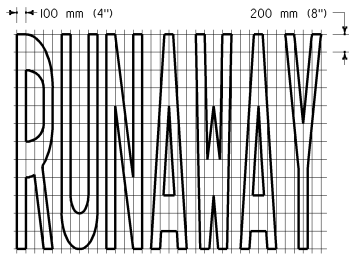
DIST.	COUNTY	ROUTE	POST MILES	SHEET TOTAL
			TOTAL PROJECT	NO. SHEETS

REGISTERED CIVIL ENGINEER DATE _____

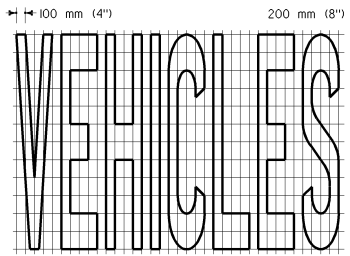
July 1, 2002
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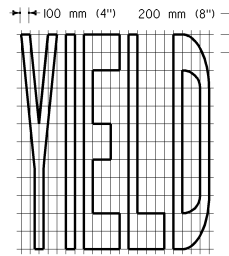
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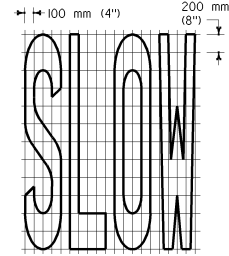
A=3.99 m² (43 SQFT)



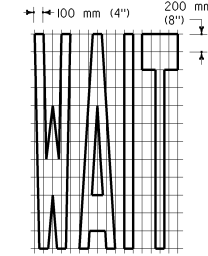
A=3.90 m² (42 SQFT)



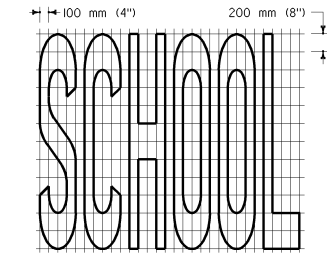
A=2.23 m² (24 SQFT)



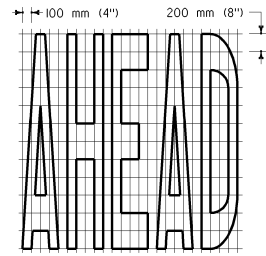
A=2.14 m² (23 SQFT)



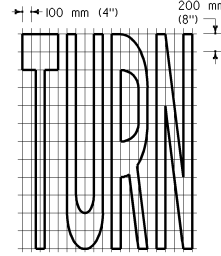
A=1.76 m² (19 SQFT)



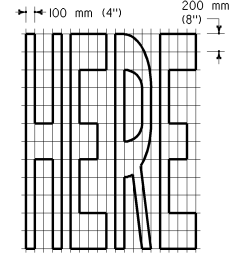
A=3.25 m² (35 SQFT)



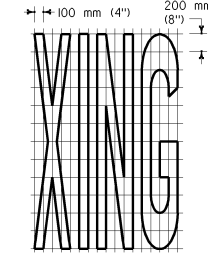
A=2.88 m² (31 SQFT)



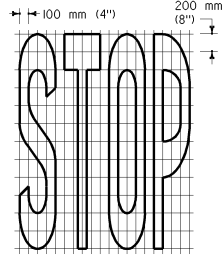
A=2.23 m² (24 SQFT)



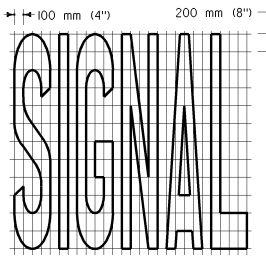
A=2.42 m² (26 SQFT)



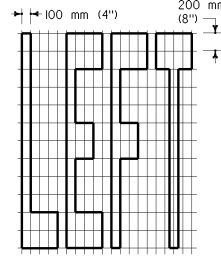
A=1.95 m² (21 SQFT)



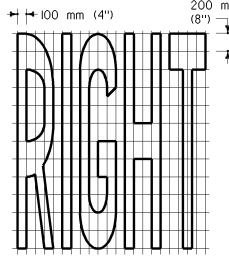
A=2.04 m² (22 SQFT)



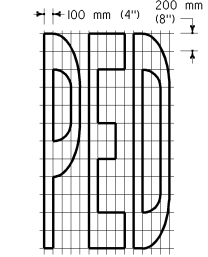
A=2.97 m² (32 SQFT)



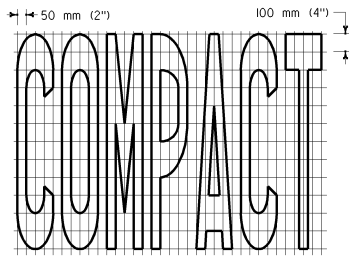
A=1.76 m² (19 SQFT)



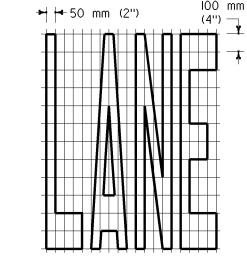
A=2.42 m² (26 SQFT)



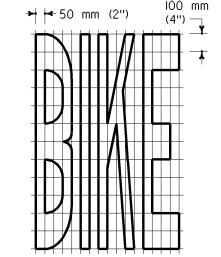
A=1.67 m² (18 SQFT)



A=0.93 m² (10 SQFT)



A=0.56 m² (6 SQFT)



A=0.46 m² (5 SQFT)

DIST.	COUNTY	ROUTE	POST MILES	SHEET TOTAL
			TOTAL PROJECT	NO. SHEETS

July 1, 2002
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NOTES:

1. If a message consists of more than one word, it should read "UP", i.e., the first word should be nearest the driver.
2. The space between words should be at least four times the height of the characters for low speed roads, but not more than ten times the height of the characters. The space may be reduced appropriately where there is limited space because of local conditions.
3. Minor variations in dimensions may be accepted by the Engineer.
4. Portions of a letter, number or symbol may be separated by connecting segments not to exceed 50 mm (2") in width.

WORD MARKINGS

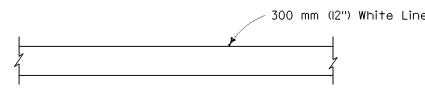
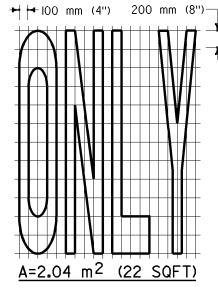
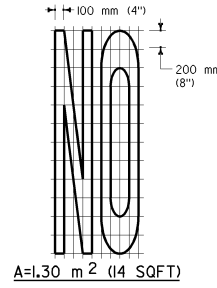
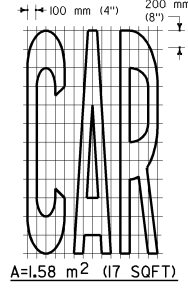
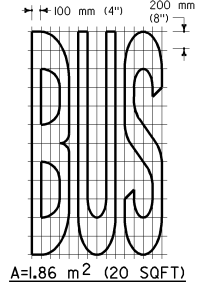
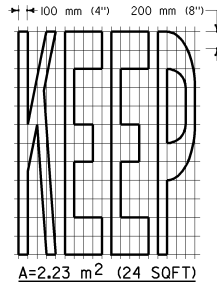
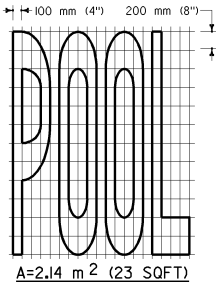
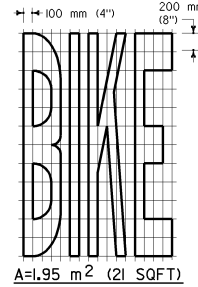
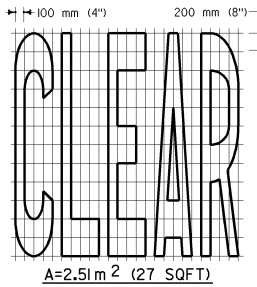
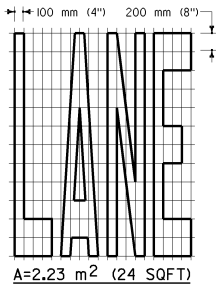
ITEM	m ² (SQFT)	ITEM	m ² (SQFT)
XING	1.95 (21)	YIELD	2.23 (24)
AHEAD	2.88 (31)	SCHOOL	3.25 (35)
WAIT	1.76 (19)	SIGNAL	2.97 (32)
LANE	0.56 (6)	TURN	2.23 (24)
RIGHT	2.42 (26)	HERE	2.42 (26)
BIKE	0.46 (5)	PED	1.67 (18)
SLOW	2.14 (23)	COMPACT	0.93 (10)
STOP	2.04 (22)	RUNAWAY	3.99 (43)
LEFT	1.76 (19)	VEHICLES	3.90 (42)

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION PAVEMENT MARKINGS WORDS

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NO SCALE

A24D



CROSSWALK AND LIMIT LINE
See Note 5

DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

Donald E. Howe
REGISTERED CIVIL ENGINEER DATE _____
July 1, 2002
PLANS APPROVAL DATE _____
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Professional Engineer
No. 46402
Exp. 3-31-03
State of California

NOTES:

1. If a message consists of more than one word, it should read "UP", i.e., the first word should be nearest the driver.
2. The space between words should be at least four times the height of the characters for low speed roads, but not more than ten times the height of the characters. The space may be reduced appropriately where there is limited space because of local conditions.
3. Minor variations in dimensions may be accepted by the Engineer.
4. Portions of a letter, number or symbol may be separated by connecting segments not to exceed 50 mm (2") in width.
5. Crosswalks contiguous to school grounds are to be 300 mm (12") yellow lines in place of 300 mm (12") white shown.

WORD MARKINGS			
ITEM	m² (SQFT)	ITEM	m² (SQFT)
LANE	2.23 (24)	NO	1.30 (14)
POOL	2.14 (23)	BIKE	1.95 (20)
CAR	1.58 (17)	BUS	1.86 (20)
CLEAR	2.51 (27)	ONLY	2.04 (22)
KEEP	2.23 (24)		

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**PAVEMENT MARKINGS
WORDS AND CROSSWALKS**

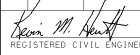

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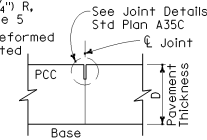
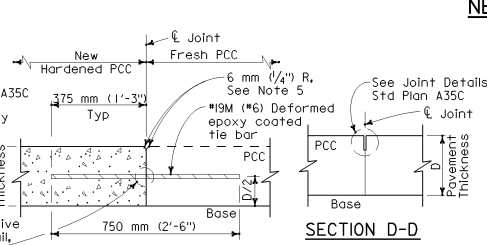
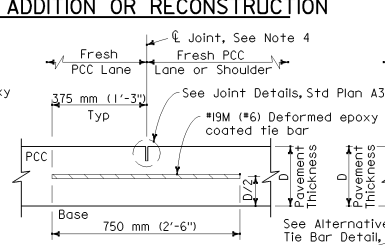
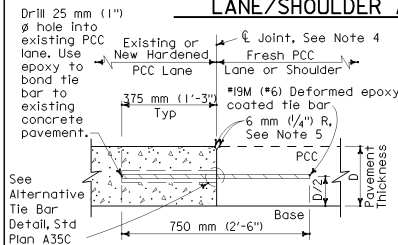
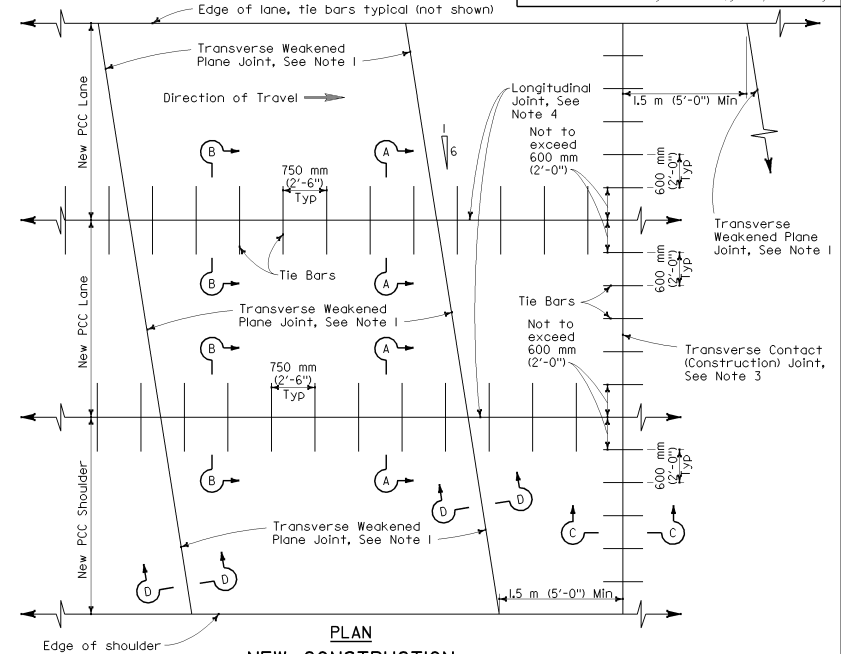
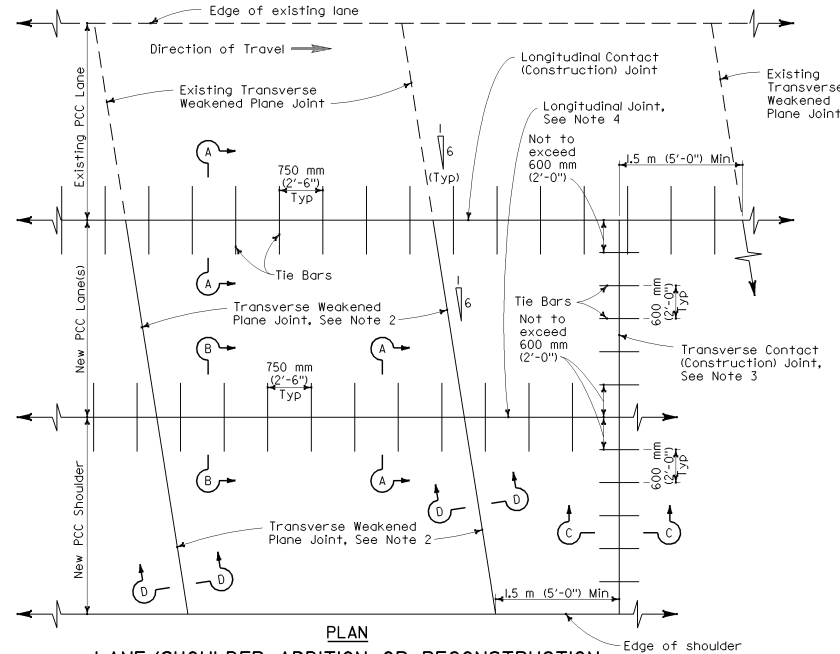
NO SCALE

A24E

NOTES

- Transverse weakened plane joints shall be constructed in new portland cement concrete pavement on the skewed offset, as shown, and spaced at successive repeated intervals of 3.6 m (12'), 4.6 m (15'), 4.0 m (13') and 4.3 m (14'), except for the first joint at pavement end anchors and structure approaches. The skewed offset shall be 1 to 6 and rotated counter clockwise.
- New transverse weakened plane joints shall match the skewed offset and spacing of the adjacent existing weakened plane joints, as shown. Where the existing transverse weakened plane joint spacing exceeds 4.6 m (15'), an additional transverse weakened plane joint shall be constructed equal distance between the existing joints.
- Transverse contact (construction) joints, with tie bars spaced as shown, shall be installed at the end of paving operations and elsewhere if ordered by the Engineer. Transverse contact (construction) joints shall be placed at least 1.5 m (5'-0") from any weakened plane joint.
- Construct longitudinal weakened plane joints as shown in Section B-B when more than one lane or shoulder widths are placed at one time. If constructing one lane at a time, use longitudinal contact (construction) joint, as shown in Section A-A.
- If fresh portland cement concrete is placed adjacent to existing portland cement concrete, the top corner of the existing portland cement concrete does not need to be rounded to 6 mm (1/4") radius, as shown.

DIST	COUNTY	ROUTE	POST MILES	SHEET TOTAL
			TOTAL PROJECT	NO. SHEETS
 REGISTERED CIVIL ENGINEER				
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SECTION D-D TRANSVERSE WEAKENED PLANE JOINT

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION PORTLAND CEMENT CONCRETE PAVEMENT (UNDOWELED TRANSVERSE JOINTS)

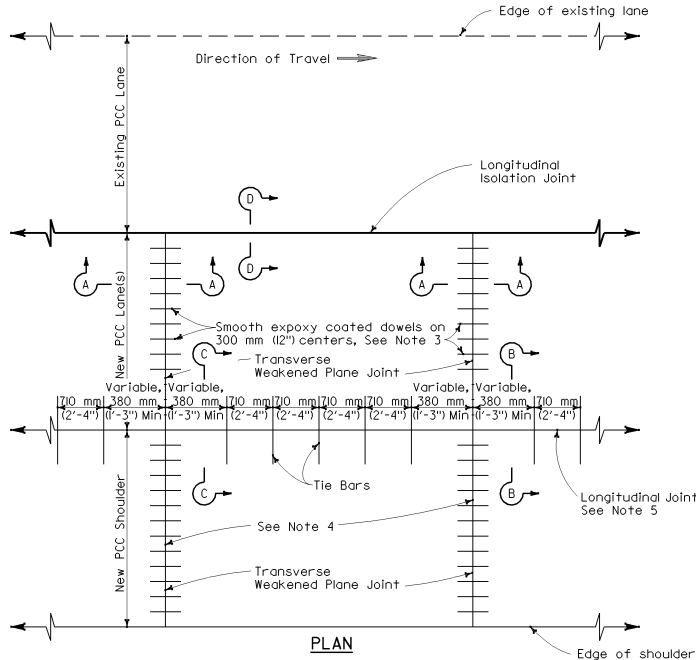
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NO SCALE

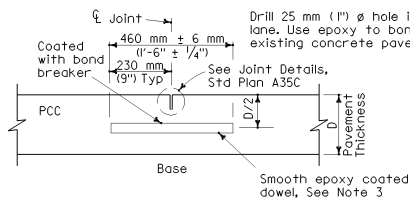
A35A

NOTES

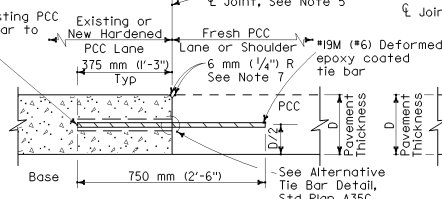
- Transverse weakened plane joints shall be constructed at right angles to the centerline or to the longitudinal pavement joints in new portland cement concrete pavement and spaced at successive repeated intervals of 3.6 m (12'), 4.6 m (15'), 4.0 m (13') and 4.3 m (14').
- Where Lean Concrete Base is not used as base material, as shown in Section D-D, the joint filler material shall only extend to the bottom of the new portland cement concrete slab.
- 38 mm (1 1/2") ϕ smooth epoxy coated dowels are to be used with a pavement thickness, D, equal to or greater than 215 mm (8.5"). For a pavement thickness, D, less than 215 mm (8.5"), use 32 mm (1 1/4") ϕ smooth epoxy coated dowels.
- Dowels shall be placed in the transverse weakened plane joints in portland cement concrete shoulders unless otherwise specified in the Special Provisions.
- Construct longitudinal weakened plane joints as shown in Section C-C when more than one lane or shoulder widths are placed at one time. If constructing one lane at a time, use longitudinal contact (construction) joint, as shown in Section B-B.
- Transverse contact (construction) joints shall be installed at the end of all paving operations, and elsewhere if ordered by the Engineer. The location of the joint shall coincide with the successive interval spacing of transverse weakened plane joints when terminating paving operations.
- If fresh portland cement concrete is placed adjacent to existing portland cement concrete, the top corner of the existing portland cement concrete does not need to be rounded to the 6 mm (1/4") radius, as shown.



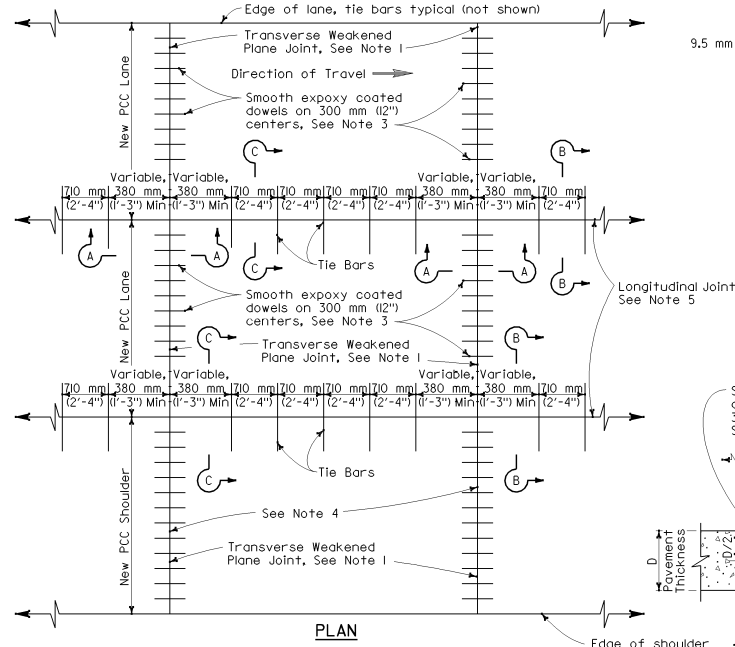
LANE/SHOULDER ADDITION OR RECONSTRUCTION



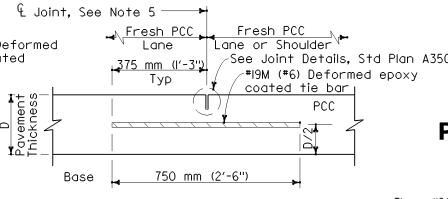
SECTION A-A, DOWEL DETAIL
TRANSVERSE WEAKENED
PLANE JOINT



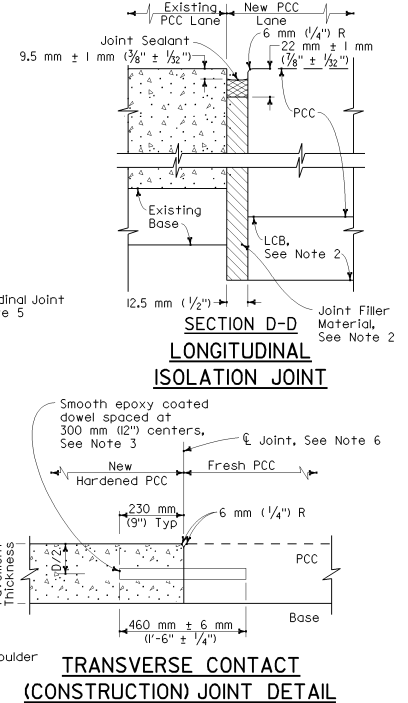
SECTION B-B, TIE BAR DETAIL
LONGITUDINAL CONTACT
(CONSTRUCTION) JOINT



NEW CONSTRUCTION



SECTION C-C, TIE BAR DETAIL
LONGITUDINAL WEAKENED
PLANE JOINT



TRANSVERSE CONTACT (CONSTRUCTION) JOINT DETAIL

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION PORTLAND CEMENT CONCRETE PAVEMENT (DOWELED TRANSVERSE JOINTS)

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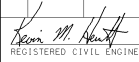
NO SCALE

A35B

NOTES

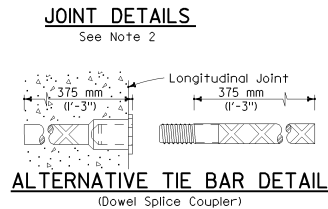
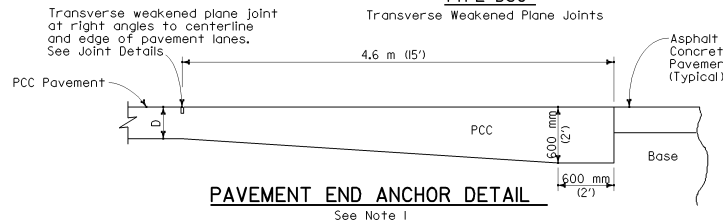
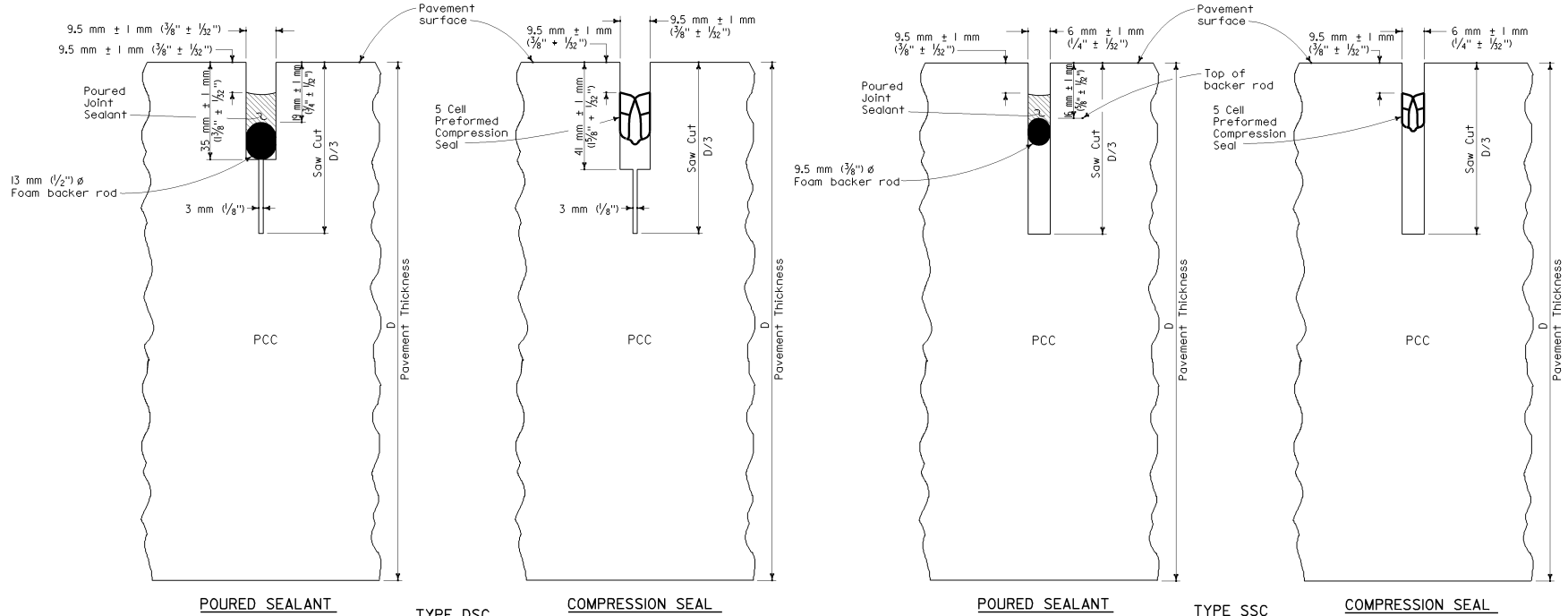
1. Pavement end anchors, are required at portland cement concrete pavement termini when the concrete pavement termini does not abut structure approach slabs, structures, or existing portland cement concrete pavement, as shown on the plans or where directed by the Engineer.
2. Tie bars and dowels are not shown, see Standard Plans A35A, as applicable.

DIST.	COUNTY	ROUTE	POST MILES	SHEET TOTAL
			TOTAL PROJECT	NO. SHEETS


 REGISTERED CIVIL ENGINEER
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 No. C36577
 Exp. 6-30-04
 STATE OF CALIFORNIA
 PROFESSIONAL ENGINEER

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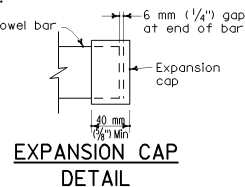
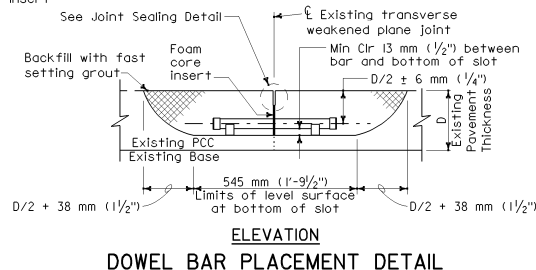
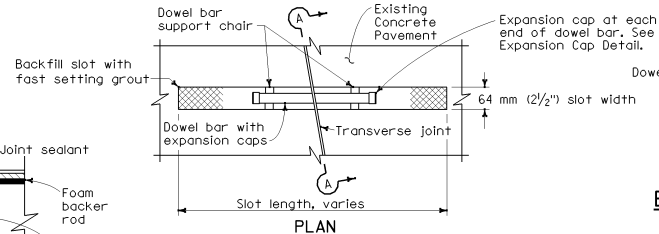
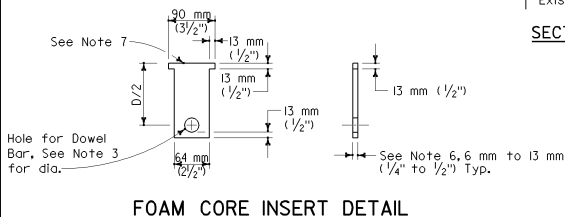
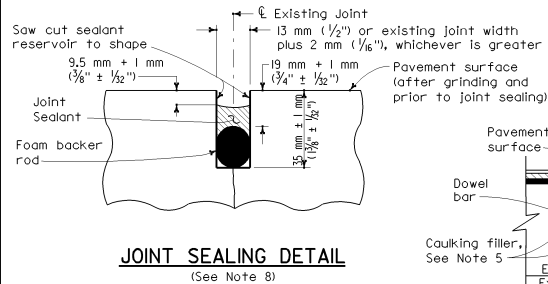
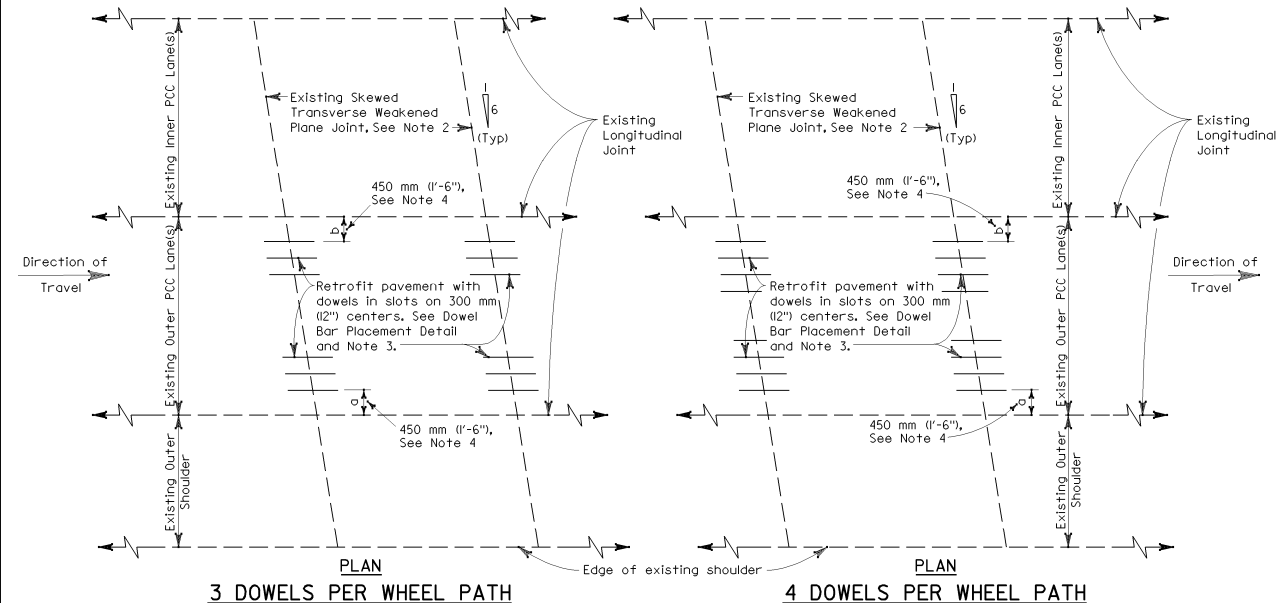
Transverse Weakened Plane or Longitudinal Weakened Plane Joints

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION **PORTLAND CEMENT CONCRETE PAVEMENT JOINT AND END ANCHOR DETAILS**

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NO SCALE

A35C



STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DOWEL BAR RETROFIT IN EXISTING CONCRETE PAVEMENT (LONGITUDINAL JOINTS COINCIDE WITH LANELINE PAVEMENT DELINEATION)

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NO SCALE

A35D

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			TOTAL PROJECT	NO. SHEETS

Kevin M. Herriott
REGISTERED CIVIL ENGINEER

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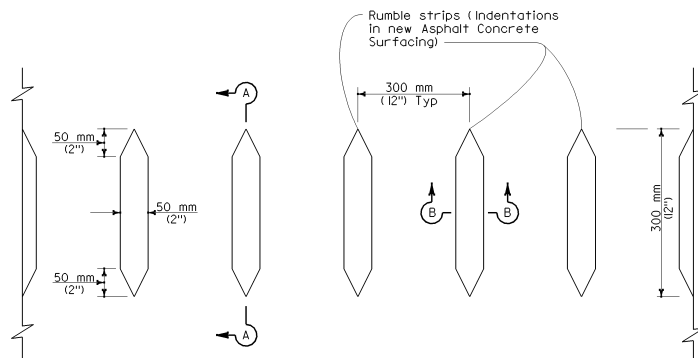
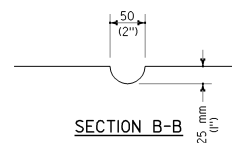
Kevin M. Herriott
REGISTERED PROFESSIONAL ENGINEER
No. C36377
Exp. 6-30-04
STATE OF CALIFORNIA

NOTES:

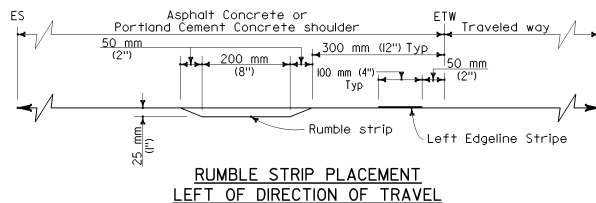
- See Project Plans for existing pavement thickness, D, the number of dowels per wheel path and the lanes to be retrofitted.
- The details shown on this plan for dowel bar retrofit also apply to existing concrete pavement constructed with transverse weakened plane joints at right angles to the centerline or longitudinal pavement joints.
- 38 mm (1 1/2") ϕ smooth epoxy coated dowels 460 mm \pm 6 mm (1'-6" \pm 1/4") in length are to be used when the existing pavement thickness, D, is equal to or greater than 215 mm (0.70'). For a pavement thickness, D, less than 215 mm (0.70'), use 32 mm (1 1/4") ϕ smooth epoxy coated dowels 460 mm \pm 6 mm (1'-6" \pm 1/4") in length.
- Where the existing outer shoulder structural section is asphalt concrete or portland cement concrete without tie bars in the longitudinal joints of the retrofit lane, the 'a' dimension shall be 300 mm (12") and the 'b' dimension shall be 600 mm (24").
- Seal existing transverse joint at bottom and sides of the dowel bar slot with caulking filler prior to placing dowel bar and foam core insert.
- Thickness of foam core insert to match width of existing transverse weakened plane joint. See Project Plans for joint widths.
- The top of the foam core insert is to match the top of the existing pavement surface initially. The upper portion of insert will be removed during shaping of the sealant reservoir.
- The transverse weakened plane joint is to be sealed within the width of the pavement lane receiving the dowel bar retrofit.

SECTION A-A

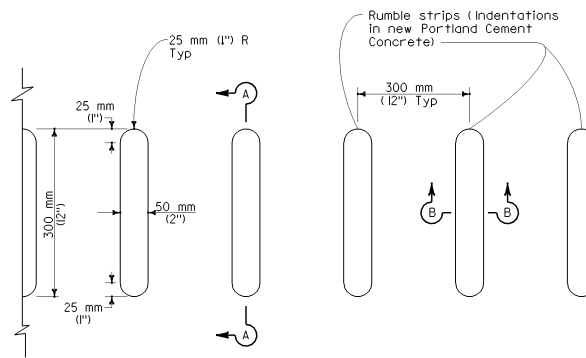
SECTION B-B



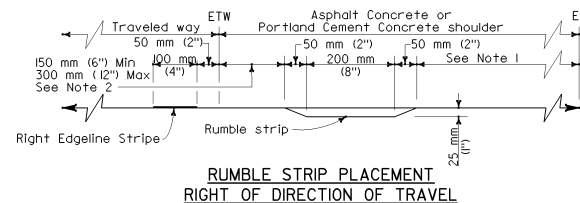
PLAN
ASPHALT CONCRETE SURFACING
ROLLED-IN IDENTATIONS
DETAIL A



TYPICAL ROLLED-IN RUMBLE STRIP
SHOULDER PLACEMENT



PLAN
PORTLAND CEMENT CONCRETE
ROLLED-IN IDENTATIONS
DETAIL B

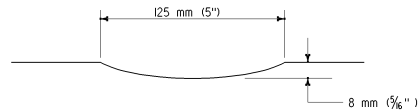


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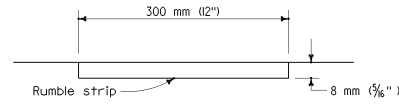
SHOULDER RUMBLE STRIP DETAILS

ROLLED-IN INDENTATIONS

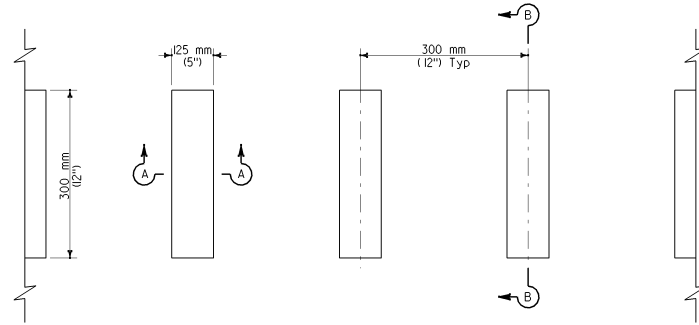
A 40A



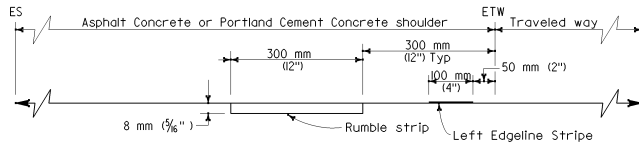
SECTION A-A



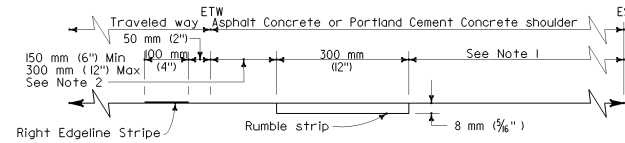
SECTION B-B



PLAN
GROUND-IN INDENTATIONS



RUMBLE STRIP PLACEMENT
LEFT OF DIRECTION OF TRAVEL



RUMBLE STRIP PLACEMENT
RIGHT OF DIRECTION OF TRAVEL

TYPICAL GROUND-IN RUMBLE STRIP
SHOULDER PLACEMENT

NOTES:

- Where bicycles are permitted, shoulder rumble strips should not be used right of direction of travel unless a minimum of 1.5 meters (5') of clear shoulder width for bicycle use is available between the rumble strip and the outer edge of the shoulder. Where bicycles are not permitted, a minimum of 1.2 meters (4') of distance is required between the rumble strip and the outer edge of the shoulder.
- Unless otherwise shown on the plans or specified in the special provisions, the 150 mm (6") offset from the edge of traveled way to the edge of the rumble strip shall be used for rumble strip placement right of the direction of travel.

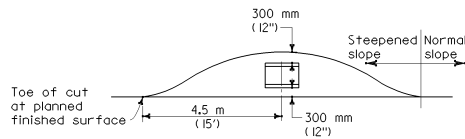
DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
Craig A. Copelan REGISTERED CIVIL ENGINEER July 1, 2002 PLANS APPROVAL DATE The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet. Caltrans now has a web site! To get to the web site, go to: http://www.dot.ca.gov					
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STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**SHOULDER RUMBLE STRIP
DETAILS
GROUND-IN INDENTATIONS**

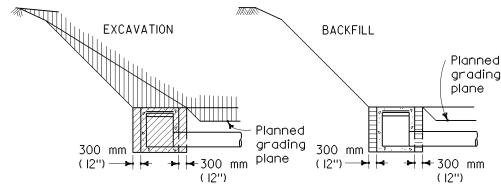
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NO SCALE

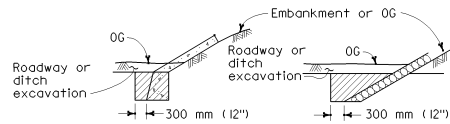
A 40B



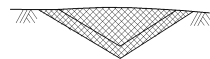
PLAN
See Note 2



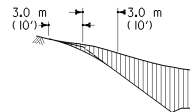
SECTION
RECESSES AT DRAINAGE INLETS



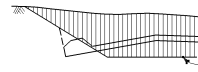
SLOPE PROTECTION
See Note 3



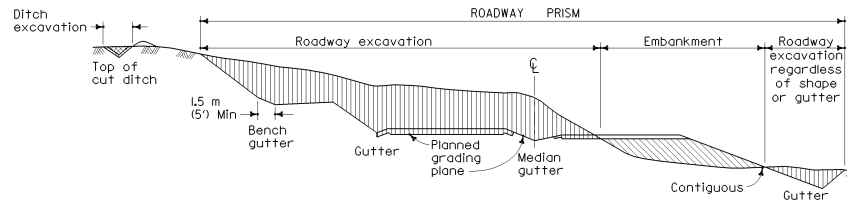
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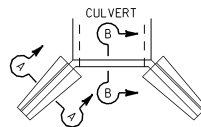
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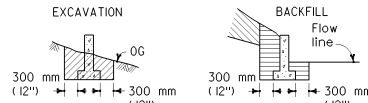
DIKE AND GUTTER



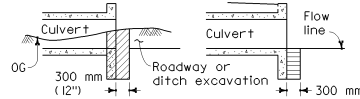
ROADWAY EXCAVATION - DITCH EXCAVATION



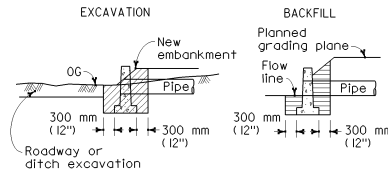
PLAN OF WING WALL



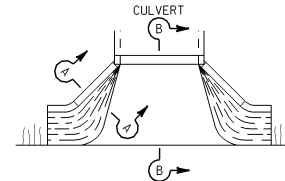
SECTION A-A



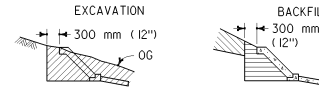
SECTION B-B
WING WALLS



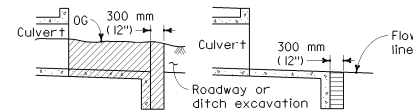
PIPE HEADWALLS



PLAN OF WARPED WING WALL



SECTION A-A



SECTION B-B
WARPED WING WALLS

NOTES

1. This drawing indicates the work to be done and limits of payment for:
Roadway Excavation
Ditch Excavation
Structure Excavation for Slope Protection
2. Slopes and dimensions may vary to fit field conditions.
3. Top limit of structure excavation is original ground if ditch is not excavated.

LEGEND

	Structure Excavation		Roadway Excavation
	Structure Backfill		Roadway Embankment
	Ditch Excavation		Original Ground
	Slope Protection		

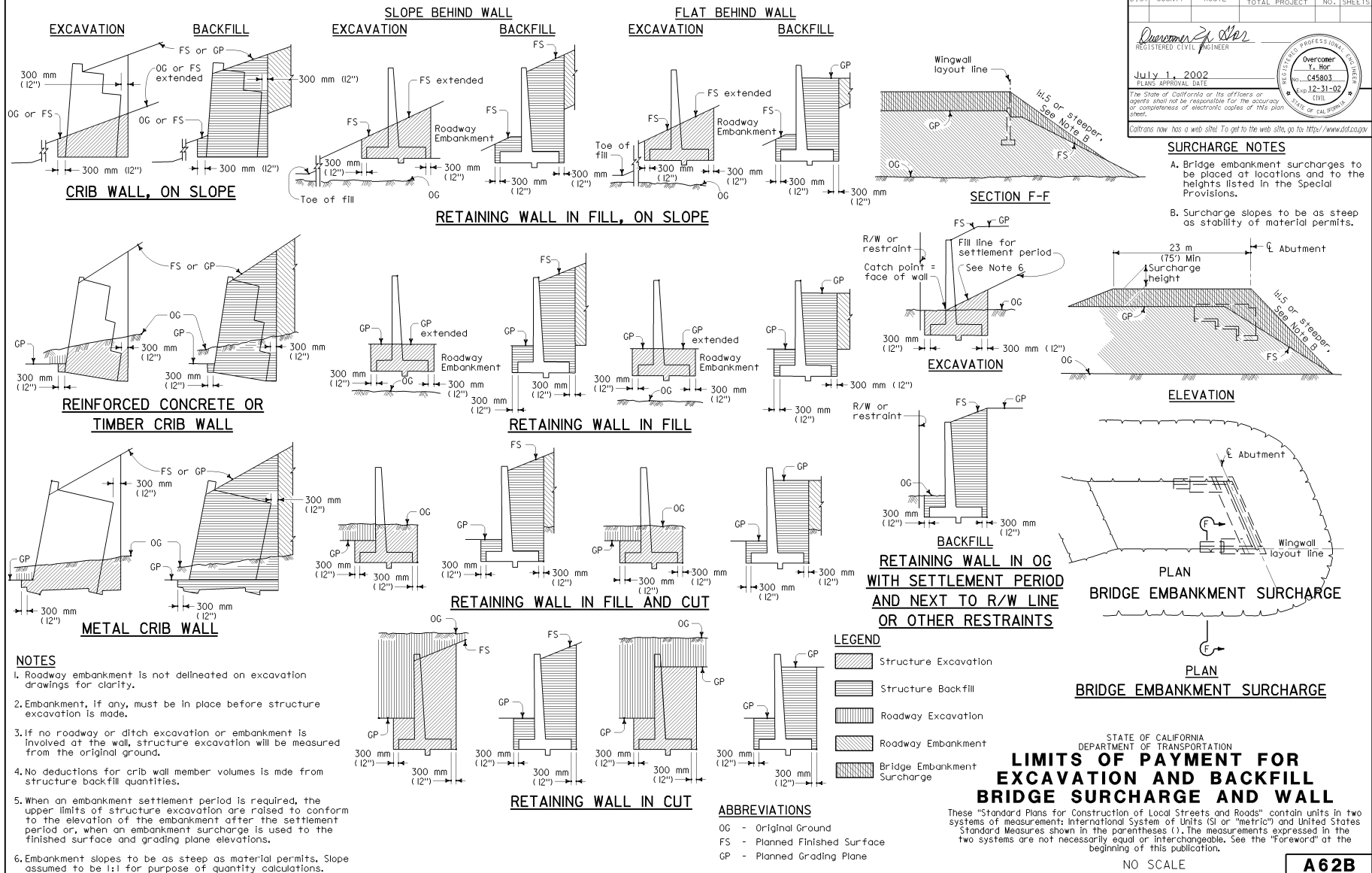
STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION EXCAVATION AND BACKFILL MISCELLANEOUS DETAILS

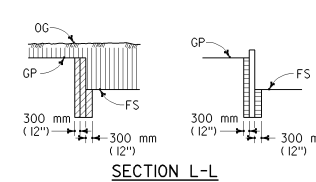
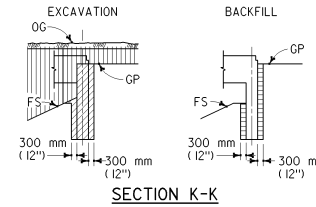
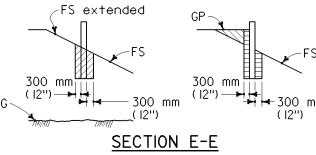
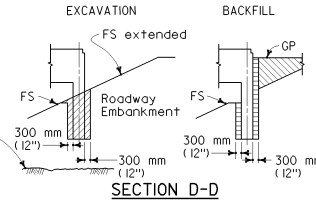
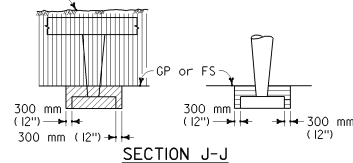
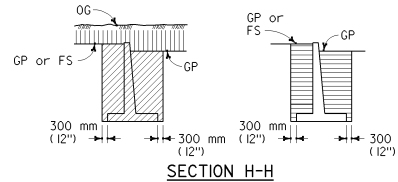
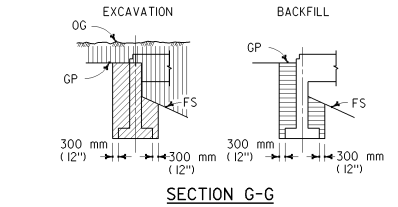
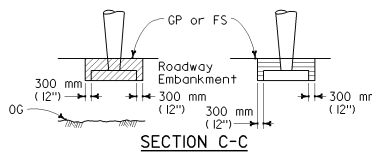
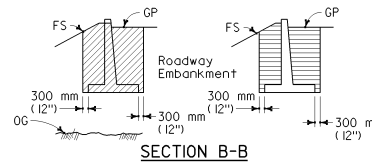
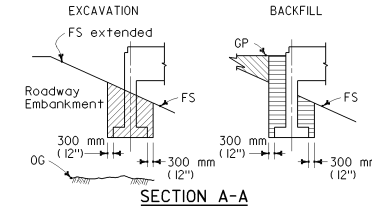
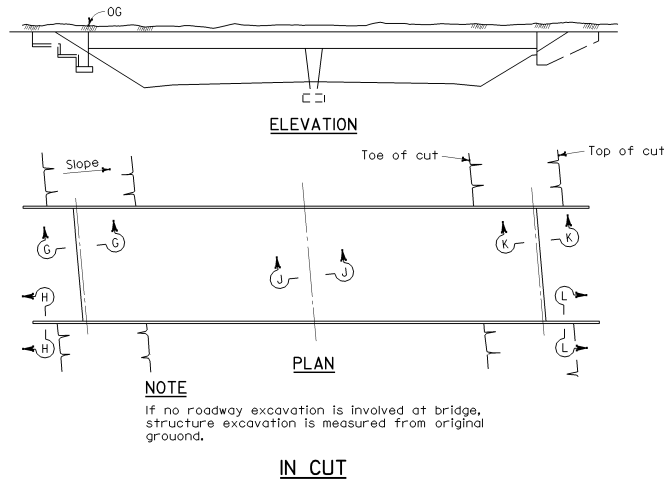
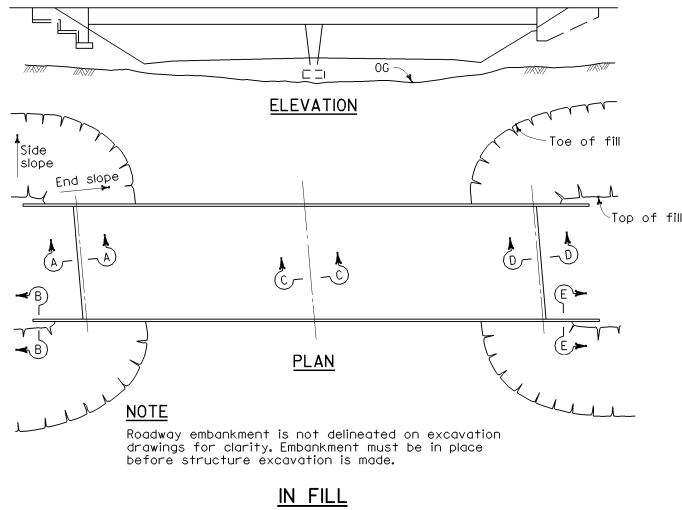
These "Standard Plans for Construction of Local Streets and Roads" contain units in two systems of measurement: International System of Units (SI or "metric") and United States Standard Measures shown in the parentheses (). The measurements expressed in the two systems are not necessarily equal or interchangeable. See the "Foreword" at the beginning of this publication.

NO SCALE

A62A

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
<p><i>Paul Cotter</i> REGISTERED CIVIL ENGINEER</p> <p>July 1, 2002 PLANS APPROVAL DATE</p> <p>The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.</p> <p>Caltrans now has a web site! To get to the web site, go to http://www.dot.ca.gov</p>					
<p>Professional Engineer No. C34502 Exp. 9-30-03 STATE OF CALIFORNIA</p>					





DIST	COUNTY	ROUTE	KILOMETER POST	SHEET TOTAL
				NO. SHEETS

Overcomer Y. Mor
REGISTERED CIVIL ENGINEER
No. C45803
Exp. 12-31-06
STATE OF CALIFORNIA

July 1, 2002
PLANS APPROVAL DATE

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ABBREVIATIONS

OG Original Ground
FS Planned Finished Surface
GP Planned Grading Plane

LEGEND

Structure Excavation
Structure Backfill
Roadway Excavation
Roadway Embankment

LIMITS OF PAYMENT FOR EXCAVATION AND BACKFILL BRIDGE

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NO SCALE

A62C

MINIMUM ALLOWABLE CLASSES OF RCP FOR METHOD 1

Cover	Minimum Class & D-Load
1.80 m (5.9')	Class II, 50D, (1000D)
1.81 m - 2.40 m (6.0' - 7.9')	Class III, 65D, (1350D)
2.41 m - 3.00 m (8.0' - 9.9')	Class III, Special 80D, (Special 1700D)
3.01 m - 3.60 m (10.0' - 11.9')	Class IV, 100D, (2000D)
3.61 m - 4.20 m (12.0' - 13.9')	Class IV, Special 120D, (Special 2500D)
4.21 m - 5.10 m (14.0' - 16.9')	Class V, 140D, (3000D)
5.11 m - 6.00 m (17.0' - 20.0')	Class V, Special 170D, (Special 3600D)

See Notes 6 and 9

MINIMUM ALLOWABLE CLASSES OF RCP FOR METHOD 2

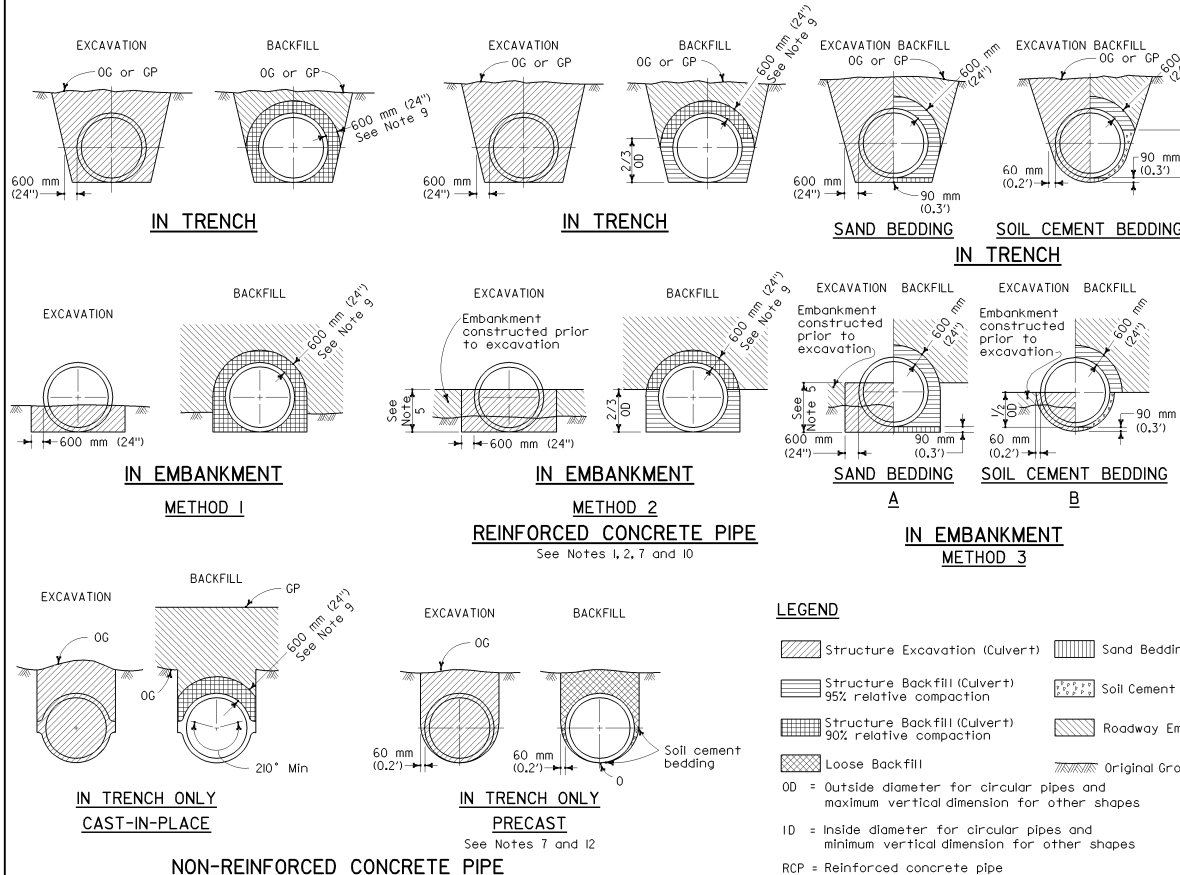
Cover	Minimum Class & D-Load
4.80 m (15.9')	Class II, 50D, (1000D)
4.81 m - 6.00 m (16.0' - 19.9')	Class III, 65D, (1350D)
6.01 m - 7.50 m (20.0' - 24.9')	Class III, Special 80D, (Special 1700D)
7.51 m - 8.50 m (25.0' - 27.9')	Class IV, 100D, (2000D)
8.51 m - 10.60 m (28.0' - 34.9')	Class IV, Special 120D, (Special 2500D)
10.61 m - 12.80 m (35.0' - 41.9')	Class V, 140D, (3000D)
12.81 m - 15.00 m (42.0' - 50.0')	Class V, Special 170D, (Special 3600D)

See Notes 8 and 9

MINIMUM ALLOWABLE CLASSES OF RCP FOR METHOD 3

Cover	Minimum Class & D-Load
7.90 m (25.9')	Class II, 50D, (1000D)
7.91 m - 9.70 m (26.0' - 31.9')	Class III, 65D, (1350D)
9.71 m - 11.50 m (32.0' - 37.9')	Class III, Special 80D, (Special 1700D)
11.51 m - 13.70 m (38.0' - 44.9')	Class IV, 100D, (2000D)
13.71 m - 17.00 m (45.0' - 55.9')	Class IV, Special 120D, (Special 2500D)
17.01 m - 20.70 m (56.0' - 67.9')	Class V, 140D, (3000D)
20.71 m - 24.00 m (68.0' - 80.0')	Class V, Special 170D, (Special 3600D)

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
<div style="display: flex; justify-content: space-between;"> <div> <p><i>Paul Cotter</i></p> <p>REGISTERED CIVIL ENGINEER</p> <p>July 1, 2002</p> <p>PLANS APPROVAL DATE</p> <p>The State of California or its officers or agents shall not be responsible for the accuracy or completeness or electronic copies of this plan sheet.</p> <p>Caltrans now has a web site! To get to the web site, go to https://www.dot.ca.gov</p> </div> <div> <p>REGISTERED PROFESSIONAL ENGINEER</p> <p><i>Paul Cotter</i></p> <p>No. C24502</p> <p>Exp. 9-30-02</p> <p>STATE OF CALIFORNIA</p> </div> </div>					



LEGEND

- Structure Excavation (Culvert)
 - Structure Backfill (Culvert) 95% relative compaction
 - Structure Backfill (Culvert) 90% relative compaction
 - Loose Backfill
 - Sand Bedding
 - Soil Cement Bedding
 - Roadway Embankment
 - Original Ground
- OD = Outside diameter for circular pipes and maximum vertical dimension for other shapes
- ID = Inside diameter for circular pipes and minimum vertical dimension for other shapes
- RCP = Reinforced concrete pipe

NOTES

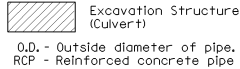
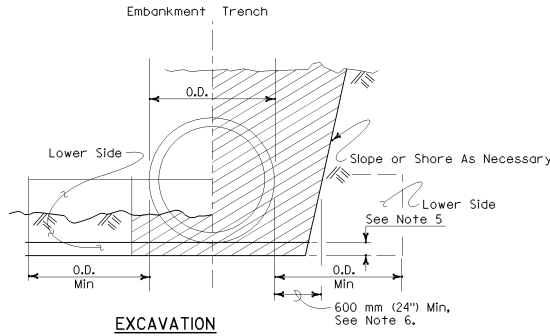
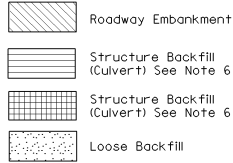
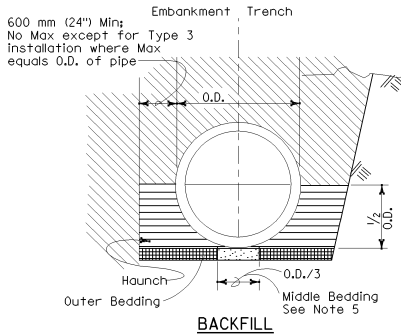
- Unless otherwise shown on the plans or specified in the Special Provisions, the Contractor shall have the option of selecting the class of RCP and the method of backfill to be used, provided the height of cover does not exceed the value shown for the RCP selected.
Example:
600 mm (24") RCP culvert with maximum cover of 5.80 m (19.0') the options are:
a) Class V Special or stronger with Method 1.
b) Class III or stronger with Method 2.
c) Class II or stronger with Method 3.
Cover is defined as the maximum vertical distance from top of pipe to finished grade within the length of any given culvert.
- The class of RCP, method of backfill and bedding selected shall be the same throughout the length of any given culvert.
- The "length of any culvert" is defined as the culvert between:
a) Successive drainage structures (inlets, junction boxes, headwalls, etc.).
b) A drainage structure and the inlet or outlet end of the culvert.
c) The inlet and outlet end of the culvert when there are no intervening drainage structures.
- Slope or shore excavation sides as necessary.
- Embankment height prior to excavation for installation of all classes of RCP under Methods 2 and 3A shall be as follows:
Pipe sizes 300 mm to 1050 mm (12" to 42"), ID = 750 mm (30")
Pipe sizes 1200 mm to 2100 mm (48" to 84"), ID = 2/3 OD
Pipe sizes larger than 2100 mm (84"), ID = 1500 mm (60")
- The maximum size for all classes of RCP placed under Method 1 is 1950 mm (78") ID.
- Non-reinforced precast pipe sizes 900 mm (36") or smaller may also be placed under Methods 1, 2 or 3.
- Oval or arch shaped RCP shall be placed under Method 2 only.
- Embankment compaction requirements govern over the 90% relative compaction backfill requirement within 750 mm (30") of finished grade.
- Backfill shall be placed full width of excavation except where dimensions are shown for backfill width or thickness. Dimensions shown are minimums.
- Minimum cover over top of pipe at edge of traveled way shall be 600 mm (24") for AC pavement and 300 mm (12") for PCC pavement.
- Where the precast non-reinforced concrete pipe is used as a substitute for the cast-in-place pipe, both the wall thickness and the concrete strength shall be at least as great as that specified for the cast-in-place pipe. The fill height allowed shall not exceed that shown for the cast-in-place pipe.

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION EXCAVATION AND BACKFILL CONCRETE PIPE CULVERTS

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NO SCALE

A62D



INSTALLATION TYPE 1

Cover	Minimum Class & D-Load
2700 mm (108\") DIA AND SMALLER	OVER 2700 mm (108\") DIA
4.50 m (14.9')	4.00 m (12.9')
4.51 m - 6.40 m (15.0' - 20.9')	4.01 m - 5.80 m (13.0' - 18.9')
6.41 m - 8.20 m (21.0' - 26.9')	5.81 m - 7.60 m (19.0' - 24.9')
8.21 m - 9.70 m (27.0' - 31.9')	7.61 m - 9.40 m (25.0' - 29.9')
9.71 m - 12.50 m (32.0' - 40.9')	9.41 m - 11.90 m (30.0' - 38.9')
12.51 m - 15.20 m (41.0' - 49.9')	11.91 m - 14.30 m (39.0' - 46.9')
15.21 m - 18.00 m (50.0' - 59.0')	14.31 m - 17.70 m (47.0' - 58.0')
	Class II, J400 (10000)
	Class III, J650 (13500)
	Class III, Special 800 (17000)
	Class IV, J1000 (20000)
	Class IV, Special 1200 (25000)
	Class V, J400 (30000)
	Class V, Special 1700 (35000)

INSTALLATION TYPE 2

Cover	Minimum Class & D-Load
3.00 m (9.9')	Class II, J500 (10000)
3.01 m - 4.60 m (10.0' - 14.9')	Class III, J650 (13500)
4.61 m - 6.10 m (15.0' - 19.9')	Class III, Special 800 (17000)
6.11 m - 7.60 m (20.0' - 24.9')	Class IV, J1000 (20000)
7.61 m - 9.80 m (25.0' - 31.9')	Class IV, Special 1200 (25000)
9.81 m - 11.90 m (32.0' - 38.9')	Class V, J400 (30000)
11.91 m - 14.30 m (39.0' - 47.0')	Class V, Special 1700 (35000)

INSTALLATION TYPE 3

Cover	Minimum Class & D-Load
1200 mm (48\") DIA AND SMALLER	OVER 1200 mm (48\") DIA
2.40 m (7.9')	1.80 m (5.9')
2.41 m - 3.40 m (8.0' - 10.9')	1.81 m - 2.70 m (6.0' - 8.9')
3.41 m - 4.60 m (11.0' - 14.9')	2.71 m - 4.00 m (9.0' - 12.9')
4.61 m - 9.70 m (15.0' - 17.9')	4.01 m - 4.90 m (13.0' - 15.9')
5.51 m - 5.50 m (18.0' - 21.9')	4.91 m - 6.10 m (16.0' - 19.9')
6.71 m - 6.70 m (22.0' - 26.9')	6.11 m - 7.60 m (20.0' - 24.9')
8.21 m - 10.00 m (33.0' - 33.0')	7.61 m - 9.50 m (25.0' - 31.0')
	Class II, J500 (10000)
	Class III, J650 (13500)
	Class III, Special 800 (17000)
	Class IV, J1000 (20000)
	Class IV, Special 1200 (25000)
	Class V, J400 (30000)
	Class V, Special 1700 (35000)

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET TOTAL SHEETS
July 1, 2002 PLANS APPROVAL DATE				
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NOTES

- Unless otherwise shown on the plans or specified in the Special Provisions, the Contractor shall have the option of selecting the class of RCP and the type of installation to be used, provided the height of cover does not exceed the value shown for the RCP selected.
Example:
600 mm (24") RCP culvert with maximum cover of 5.80 m (19.0') the options are:
a) Class III or stronger with Installation Type 1,
b) Class III Special or stronger with Installation Type 2,
c) Class IV Special or stronger with Installation Type 3.
Cover is defined as the maximum vertical distance from top of the pipe to finished grade within the length of any given culvert.
- The class of RCP and Installation Type selected shall be the same throughout the length of any given culvert.
- The "length of any culvert" is defined as the culvert between:
a) Successive drainage structure (inlets, junction boxes, headwalls, etc.),
b) A drainage structure and the inlet or outlet end of the culvert,
c) The inlet and outlet end of the culvert when there are no intervening drainage structures.
- Oval and arch shaped RCP shall not be used.
- O.D./25 Min, not less than 75 mm (3")
- Slurry cement backfill may be substituted for backfill in the outer bedding and haunch areas, if slurry is used the outer and middle beddings shall be omitted. Prior to installation the soil under the middle 1/3 of the outside diameter of the pipe shall be softened by scarifying or other means to a minimum depth of O.D./25, but not less than 75 mm (3"). Where slurry cement backfill is used, clear distance to trench wall may be reduced as set forth in Section I9-3.062 of the Standard Specifications.
- Backfill shall be placed full width of excavation except where dimensions are shown for backfill width or thickness. Dimensions shown are minimum.
- Minimum cover over top of pipe at edge of traveled way shall be 600 mm (24") for AC pavement and 300 mm (12") for PCC pavement.
- Where the pipe is placed in a trench, if the trench walls are sloped at 5 vertical to 1 horizontal or steeper for at least 90% of the trench height, or sloped up to not less than 300 mm (12") from the grading plane, the firmness of the soil in the lower side need not be considered.
- Non-reinforced precast concrete pipe sizes 900 mm (36") or smaller may be placed under installation Types 1, 2 or 3.

TYPE 1 INSTALLATION:

The haunch and outer bedding shall be compacted to a minimum 90% relative compaction. In addition, the minimum sand equivalent in these areas shall be 30 and the maximum percentage passing the 75 μ m (No. 200) sieve size shall be 12. Lower sides shall be suitable material as determined by the Engineer. Otherwise it shall be considered unsuitable as set forth in Section I9-2.02 of the Standard Specifications. See Note 9.

TYPE 2 INSTALLATION:

The haunch and outer bedding shall be compacted to a minimum 90% relative compaction. In addition, the minimum sand equivalent in these areas shall be 25. Lower side shall be suitable material as determined by the Engineer. Otherwise it shall be considered unsuitable as set forth in Section I9-2.02 of the Standard Specifications. See Note 9.

TYPE 3 INSTALLATION:

The haunch and outer bedding shall be compacted to a minimum 85% relative compaction. In addition, the minimum sand equivalent in these areas shall be 25. If the sand equivalent is between 20 and 25, 90% relative compaction will be required. This installation may not be used where the fill over the pipe is less than 1/2 O.D. Lower side shall be suitable material as determined by the Engineer. Otherwise it shall be considered unsuitable as set forth in Section I9-2.02 of the Standard Specifications. See Note 9.

EXCAVATION AND BACKFILL CONCRETE PIPE CULVERTS

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NO SCALE

A62DA

DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

Paul Cotter
REGISTERED CIVIL ENGINEER

July 1, 2002
PLANS APPROVAL DATE

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REGISTERED PROFESSIONAL ENGINEER

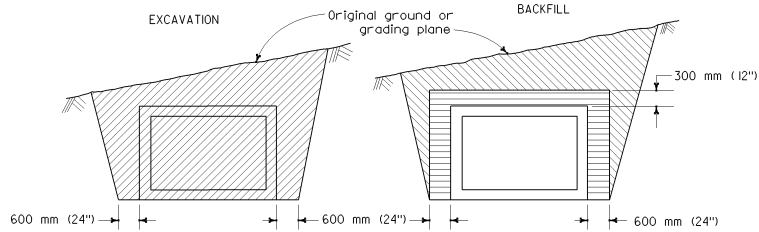
Paul Cotter

NO. C34509

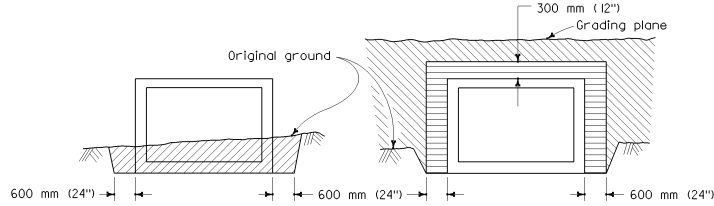
EXP. 9-30-03

CIVIL

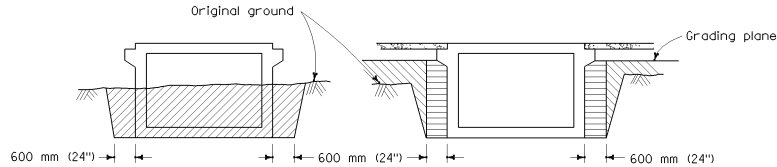
STATE OF CALIFORNIA



IN TRENCH



IN EMBANKMENT



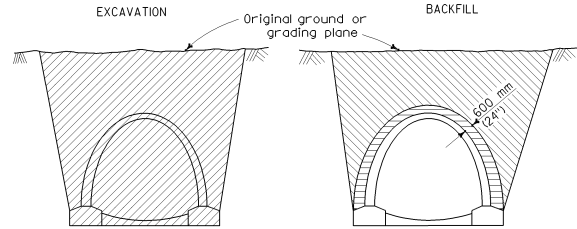
EXPOSED TOP
REINFORCED CONCRETE BOX CULVERT

NOTES

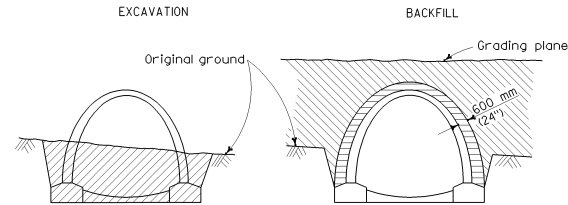
1. Slope or shore excavation sides as necessary.
2. Dimensions shown are minimum.

LEGEND

- Structure Excavation (Culvert)
- Structure Backfill (Culvert)
- Roadway Embankment
- Original Ground



IN TRENCH



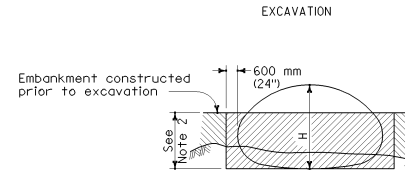
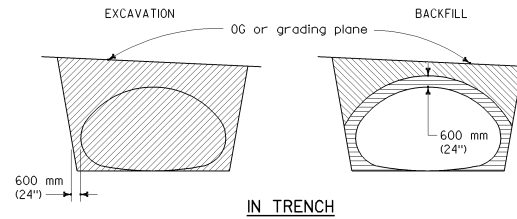
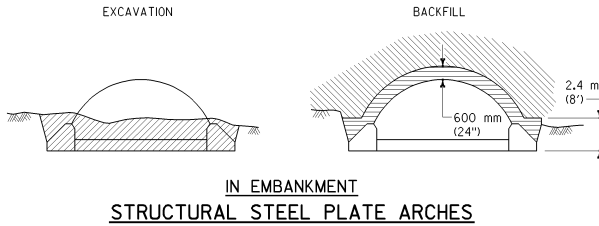
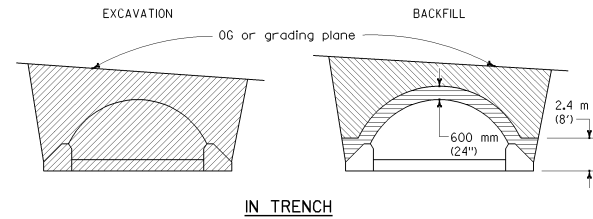
IN EMBANKMENT
REINFORCED CONCRETE ARCH CULVERT

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**EXCAVATION AND BACKFILL
CAST-IN-PLACE
REINFORCED CONCRETE BOX
AND ARCH CULVERTS**

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NO SCALE

A62E



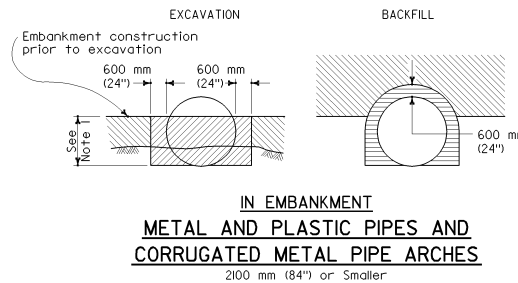
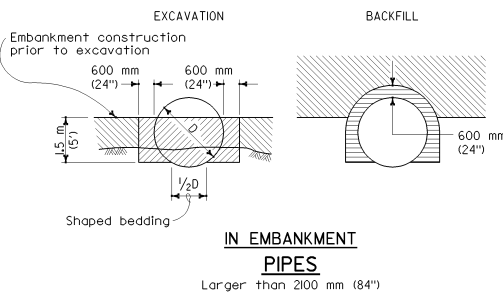
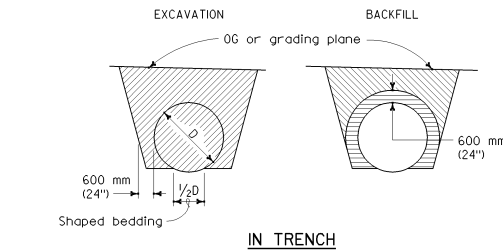
**STRUCTURAL STEEL PLATE PIPE ARCHES
AND VEHICULAR UNDERCROSSING**

NOTES

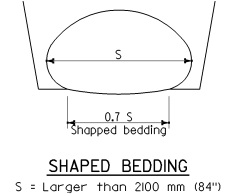
1. PIPES: 750 mm (30") minimum for diameters up to and including 1050 mm (42") then 2/3 diameter but no more than 1500 mm (60") required. CORRUGATED METAL PIPE ARCHES: 750 mm (30") maximum.
2. 2/3 H up to 1500 mm (60") maximum.
3. Slope or shore excavation sides as necessary.
4. Backfill shall be placed full width of excavation except as noted.
5. Diagrams do not apply to overside drains.
6. Dimensions shown are minimum.
7. For strutting requirement of structural steel plate pipe, arches and vehicular undercrossing during construction, see Standard Plan D88A.

LEGEND

95% Relative Compaction	



DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
<p><i>Paul Cotter</i> REGISTERED CIVIL ENGINEER</p> <p>July 1, 2002 PLANS APPROVAL DATE</p> <p>The State of California or its officers or agents shall not be responsible for the accuracy or completeness or electronic copies of this plan sheet.</p> <p>Caltrans now has a web site! To get to the web site, go to: https://www.dot.ca.gov</p>					
<p>PAUL COTTER No. C34509 9-30-03 STATE OF CALIFORNIA</p>					



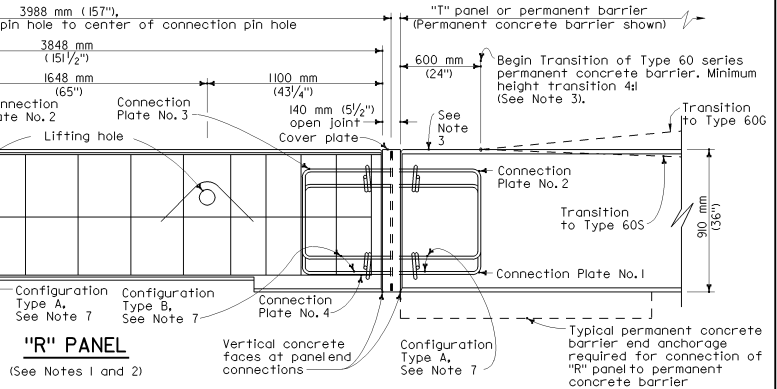
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**EXCAVATION AND BACKFILL
METAL AND PLASTIC CULVERTS**

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NO SCALE

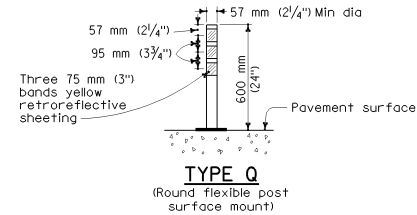
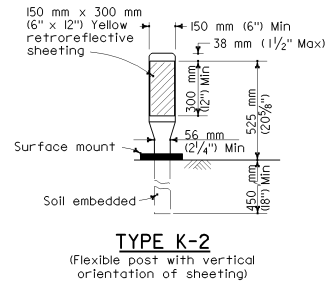
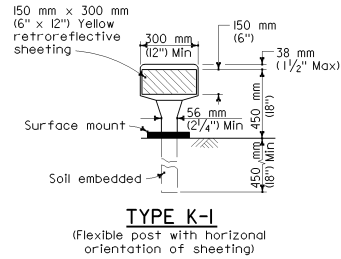
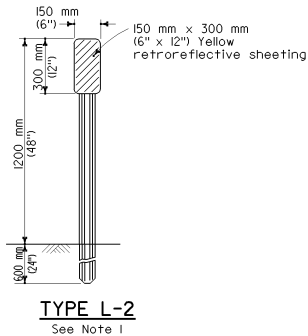
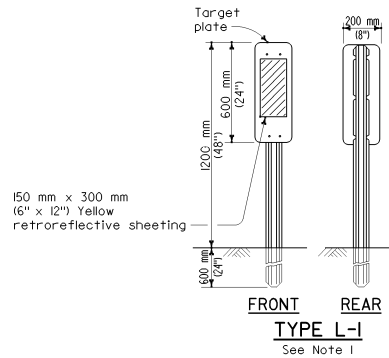
A62F

[Return to Table of Contents](#)



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A 63B

**NOTE:**

See Standard Plan A73B for metal
post details and additional markers.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
OBJECT MARKERS

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NO SCALE

A73A

DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

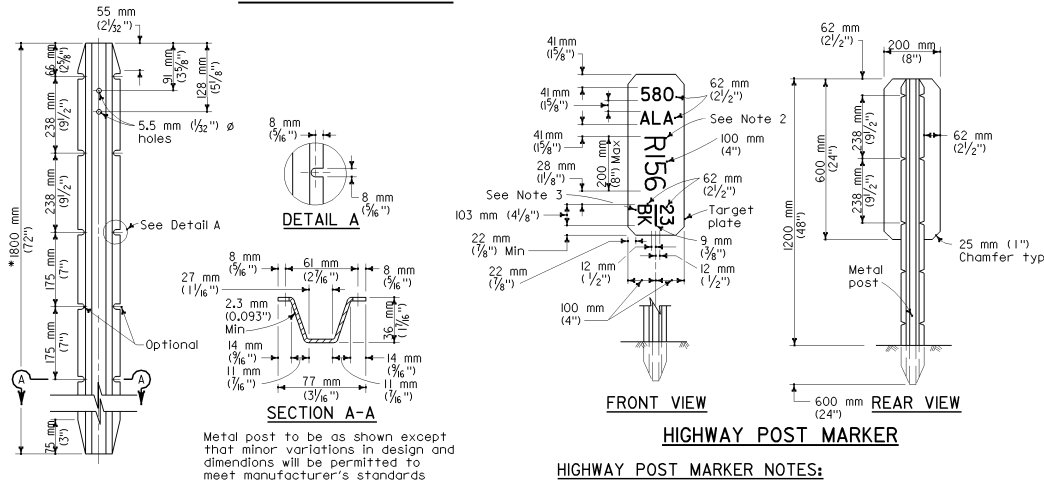
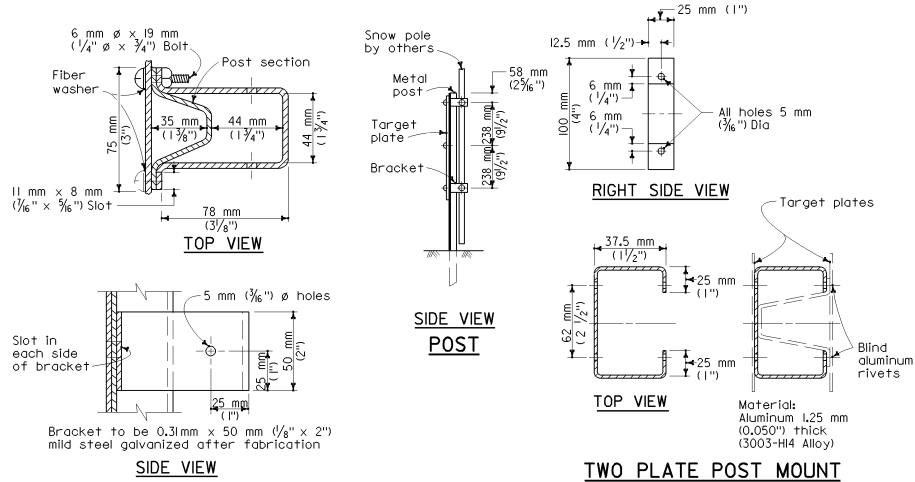
Greg W. Edwards
REGISTERED CIVIL ENGINEER

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Professional Engineer
Greg W. Edwards
No. C36386
Exp. 6-30-04
STATE OF CALIFORNIA



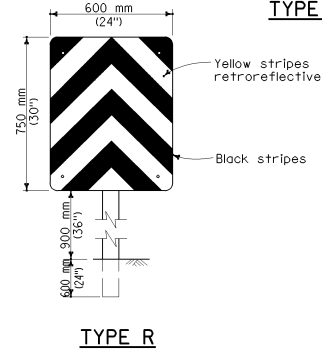
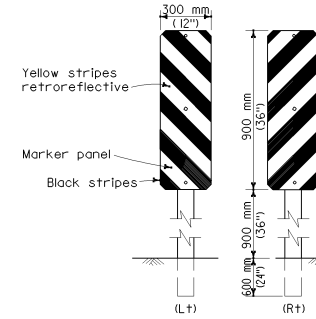
HIGHWAY POST MARKER

HIGHWAY POST MARKER NOTES:

1. The marker shall be white (non-reflective) target plate with black Series D numerals and letters.
2. A post mile prefix, such as "R", shall apply only when directed by the Engineer.
3. "BK" (Back), "AH" (Ahead), or a blank space shall apply as directed by the Engineer.
4. All information shall be in English units (miles).

NOTES:

1. See Standard Plan A73A for additional object markers.
2. Type P and R markers shall have orange and white retroreflective stripes in construction zones.



TYPE N-1, N-2 AND N-3

- N-1. Yellow retroreflective background with black border.
N-2. Red retroreflective background with black border.
N-3. Orange retroreflective background with black border.

OBJECT MARKERS

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MARKERS

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NO SCALE

A73B

DIST.	COUNTY	ROUTE	POST MILES	SHEET TOTAL
			TOTAL PROJECT	NO. SHEETS

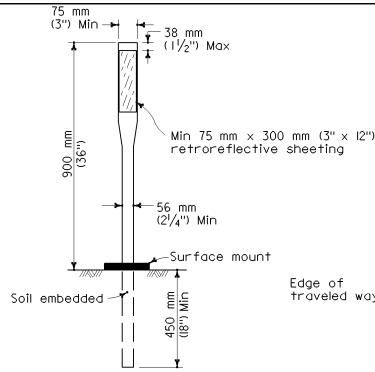
REGISTERED CIVIL ENGINEER

July 1, 2002
PLANS APPROVAL DATE

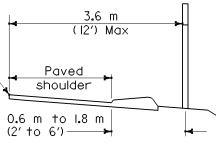
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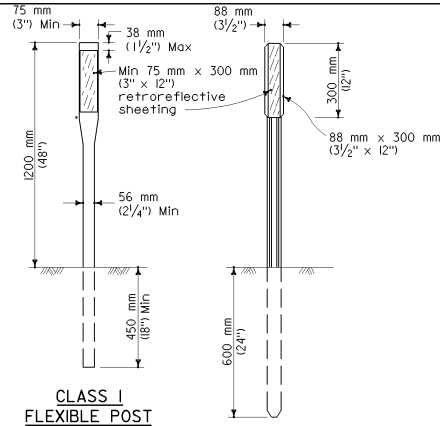
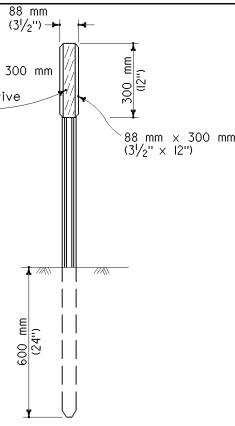
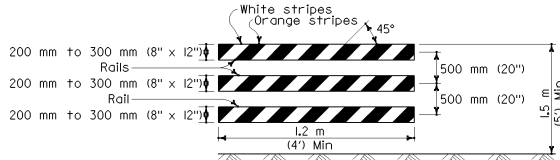
Greg W. Edwards
No. C36386
Exp. 6-30-04
STATE OF CALIFORNIA



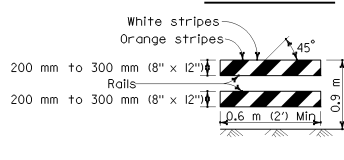
CHANNELIZERS



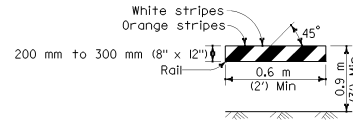
DELINEATOR POSITIONING

CLASS I
FLEXIBLE POSTCLASS 2
METAL POST
See Note 4

TYPE III BARRICADE



TYPE II BARRICADE



TYPE I BARRICADE

See Note A

BARRICADES (See Note 3)

Only face of rails shown. Barricade construction materials and supports as specified in the specifications.

BARRICADE	TYPE I	TYPE II	TYPE III
Width of Rail	200 mm Min-300 mm Max* (8" Min-12" Max)*	200 mm Min-300 mm Max* (8" Min-12" Max)*	200 mm Min-300 mm Max* (8" Min-12" Max)*
Length of Rail	0.6 m (2') Min	0.6 m (2') Min	1.2 m (4') Min
Width of Stripes **	150 mm (6")	150 mm (6")	150 mm (6")
Height	0.9 m (3') Min	0.9 m (3') Min	1.5 m (5') Min
Number of Retroreflective Rail Faces	2 (one each direction)	4 (two each direction)	3 if facing traffic in one direction 6 if facing traffic in two directions

* For the wooden option dimensions are nominal lumber dimensions.

** For rails less than 0.9 m (3') long, 100 mm (4") wide stripes shall be used.

NOTE A:

Barricades to have a minimum of 174,204 mm² (270 square inches) of retroreflective area facing traffic when used on freeways, expressways, and other high speed highways.

DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
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TYPE	DELINEATORS	
	FRONT	BACK
E	White	White (See Note I)
F	White	None
G	Yellow	None
I	Yellow	Yellow (See Note I)
J	Red	None

NOTES:

- The retroreflective sheeting used on the back of delineator shall be a minimum size of 75 mm x 75 mm (3" x 3").
- The type of delineator to be installed will be designated on the plans.
- All barricade stripes shall be retroreflective.
- See Standard Plan A73B for Metal Post Details.

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**DELINEATORS, CHANNELIZERS
AND BARRICADES**

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NO SCALE

A73C

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TYPE D

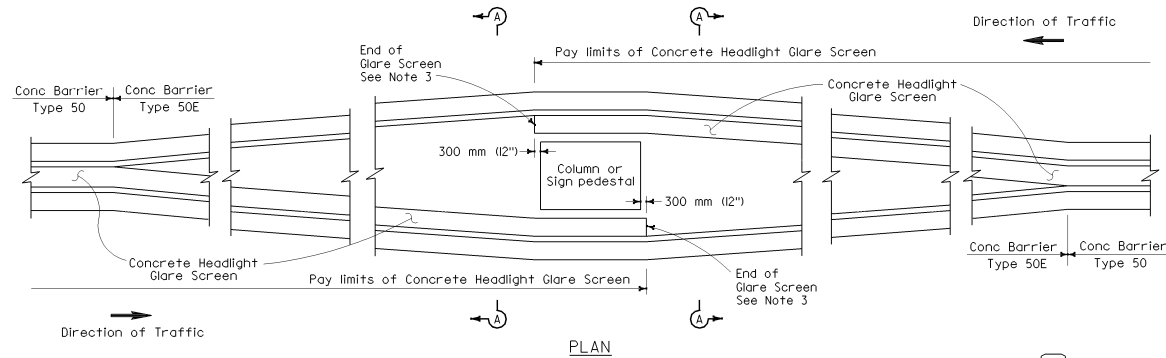
Alternative No. 2

1. The configuration of the cast iron or cast steel frame and cover may vary from that shown.
2. Frame shall be embedded in the concrete a minimum of 75 mm (3").
3. Type D monument shall be either Alternative No.1 or Alternative No.2 at the contractor's option.
4. All portland cement concrete shall be Class 2 or minor concrete with 25 mm (1") maximum aggregate.

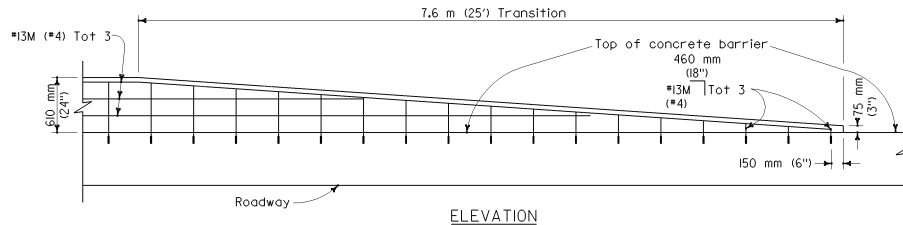
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NO SCALE

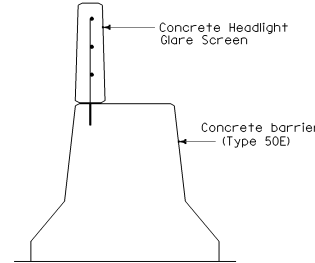
A74



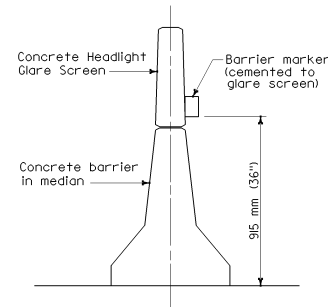
**CONCRETE HEADLIGHT GLARE SCREEN
AT CONCRETE BARRIER TYPE 50E**



**CONCRETE HEADLIGHT GLARE
SCREEN END TRANSITION**



SECTION A-A



BARRIER DELINEATION

See Notes 3 and 4

DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET TOTAL NO. SHEETS

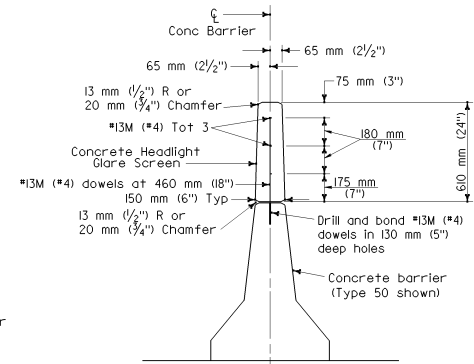
REGISTERED CIVIL ENGINEER

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No. C17926
Exp. 6-30-05
STATE OF CALIFORNIA



**CONCRETE HEADLIGHT GLARE SCREEN
ON CONCRETE BARRIER**

NOTES

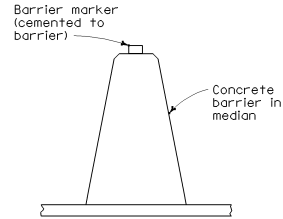
- Expansion joints in concrete glare screen shall match expansion joints in concrete barrier.
- Concrete headlight glare screen shall extend one foot beyond all columns or sign pedestals for each direction of travel. Sloped end transition of concrete glare screen not required where glare screen terminates on Concrete Barrier Type 50E.
- Barrier delineation to be used when required by the special provisions.
- Spacing of barrier markers to match spacing of raised pavement markers on the adjacent median edgeline pavement delineation.
- Full height of barrier and glare screen to be continued between columns.
- Standard Plans A75A, A75B and A75C not included in this edition of the plans.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**CONCRETE HEADLIGHT
GLARE SCREEN**

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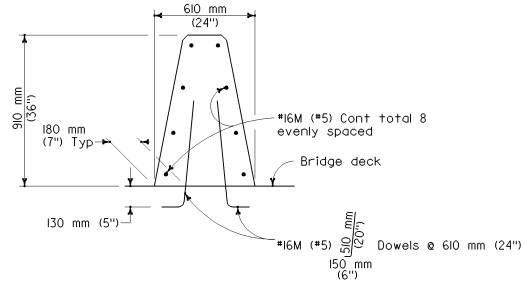
NO SCALE

A75D



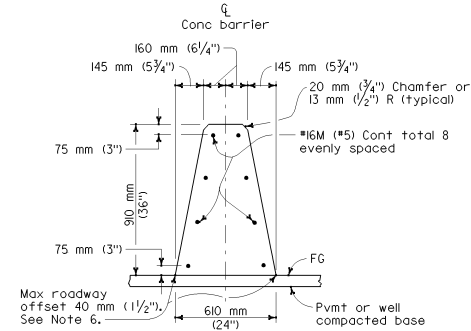
CONCRETE BARRIER TYPE 60 DELINEATION

See Notes 7 and 8

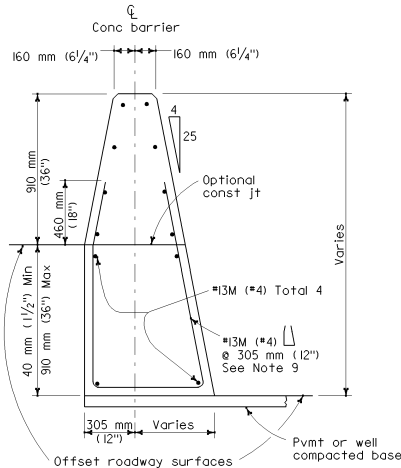


CONCRETE BARRIER TYPE 60A

Details similar to Type 60 except as noted.

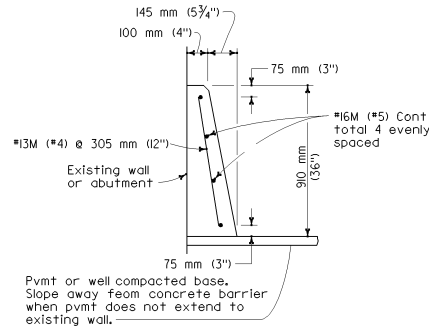


CONCRETE BARRIER TYPE 60



CONCRETE BARRIER TYPE 60C

Details similar to Type 60 except as noted.
Concrete barrier end anchor when necessary.



CONCRETE BARRIER TYPE 60D

NOTES

- See Standard Plan A76B for details of Concrete Barrier Type 60 end anchors, connection to structures and transitions to Concrete Barrier Type 50 and Concrete Barrier Type 60S.
- See Standard Plan A76C for Concrete Barrier Type 60 transitions at bridge column and sign pedestals.
- Where glare screen is required on Concrete Barrier Type 60, use Concrete Barrier Type 60C.
- Where the concrete barrier is added to the face of existing concrete structure, match existing weep holes.
- Expansion joints in concrete barrier shall be located at all deck, pavement and principle wall joints. Expansion joint filler material shall be the same size as joint or 13 mm (1/2") minimum.
- Where roadway offset is greater than 40 mm (1 1/2"), see Concrete Barrier Type 60C.
- Barrier delineation to be used when required by the Special Provisions.
- Spacing of barrier markers to match spacing of raised pavement markers on the adjacent median edgeline pavement delineation.
- Reinforcing stirrup not required for roadway offsets less than 305 mm (12").

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION CONCRETE BARRIER TYPE 60

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NO SCALE

A76A

DIST.	COUNTY	ROUTE	POST MILES	SHEET TOTAL
			TOTAL PROJECT	NO. SHEETS

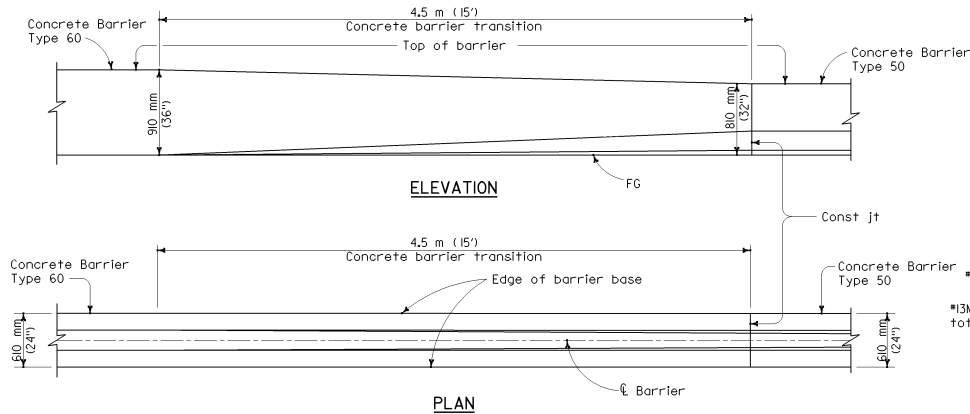
REGISTERED CIVIL ENGINEER

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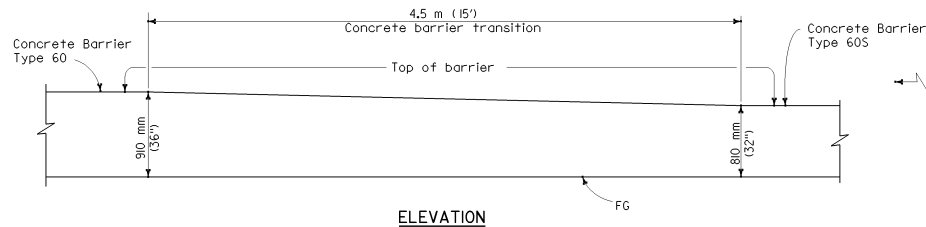
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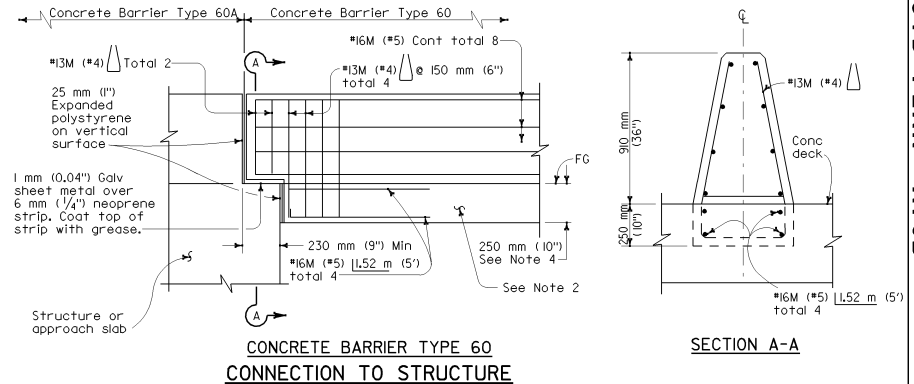
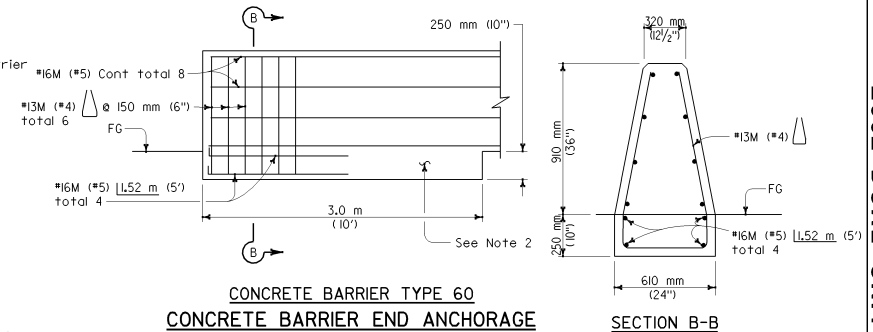
TRANSITION CONCRETE BARRIER TYPE 60 TO CONCRETE BARRIER TYPE 50



TRANSITION CONCRETE BARRIER TYPE 60 TO CONCRETE BARRIER TYPE 60S

NOTES:

1. See Standard Plan A76A for Concrete Barrier Type 60 and Type 60A.
2. Footing monolithic or doweled with 2-#25M x 205 mm @ 610 mm (#8 x 8" @ 24"). The footing is required at concrete barrier ends and at interruptions in concrete barrier.
3. Expansion joints in concrete barrier shall be located at all deck, pavement and principal wall joints. Expansion joint filler material shall be the same size as joint or 13 mm (1/2") minimum.
4. 250 mm (10") Concrete barrier footing extends 3.0 m (10'-0") back from structure.
5. See Standard Plan A78I transition to Thrie Beam Barrier.



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**CONCRETE BARRIER
TYPE 60**

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NO SCALE

A76B

DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
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Ellis K. Hirst

REGISTERED PROFESSIONAL ENGINEER

Ellis K. Hirst

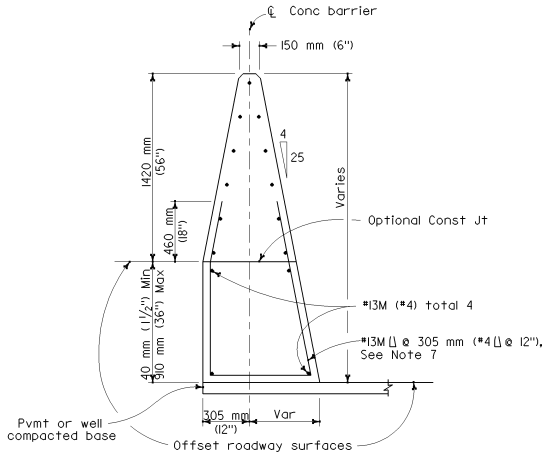
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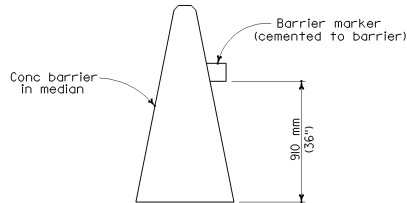
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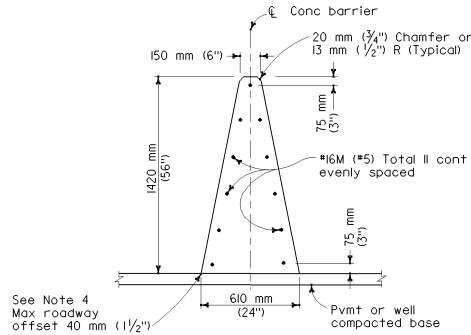
CONCRETE BARRIER TYPE 60GC

Details similar to Type 60G except as noted.



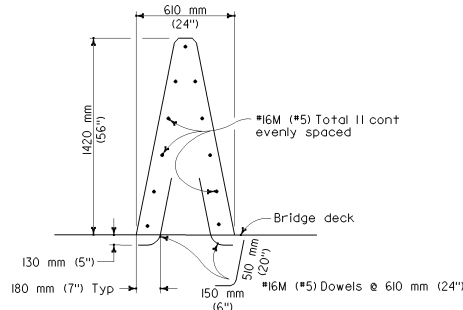
CONCRETE BARRIER TYPE 60G DELINEATION

See Notes 5 and 6



CONCRETE BARRIER TYPE 60G

(Monolithic concrete glare screen/barrier)



CONCRETE BARRIER TYPE 60GA

Details similar to Type 60G except as noted.

NOTES

1. See Standard Plan A76E for details of Concrete Barrier Type 60G end anchors, connection to structures and transitions to Concrete Barrier Type 60.
2. See Standard Plan A76F for Concrete Barrier Type 60G transitions at bridge column and sign pedestals.
3. Expansion joints in concrete barrier shall be located at all deck, pavement and principal wall joints. Expansion joint filler material shall be the same size as joint or 13 mm (1/2 inch) minimum.
4. Where roadway offset is greater than 40 mm (1 1/2 inch), see Concrete Barrier Type 60GC.
5. Barrier delineation to be used when required by the Special Provisions.
6. Spacing of barrier markers to match spacing of raised pavement markers on the adjacent median edgeline pavement delineation.
7. Reinforcing stirrup not required for offsets less than 305 mm (12 inch).

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION CONCRETE BARRIER TYPE 60G

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NO SCALE

A76D

DIST.	COUNTY	ROUTE	POST MILES	SHEET TOTAL
			TOTAL PROJECT	NO. SHEETS

REGISTERED CIVIL ENGINEER

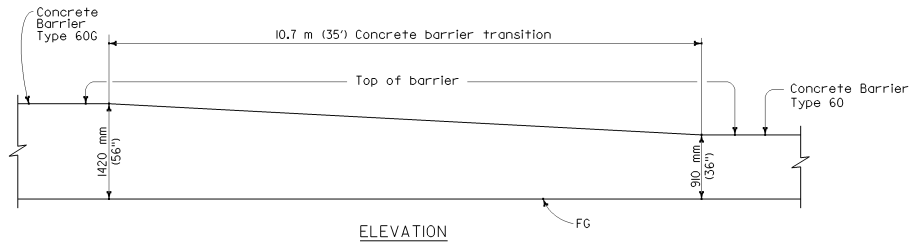
July 1, 2002

PLANS APPROVAL DATE

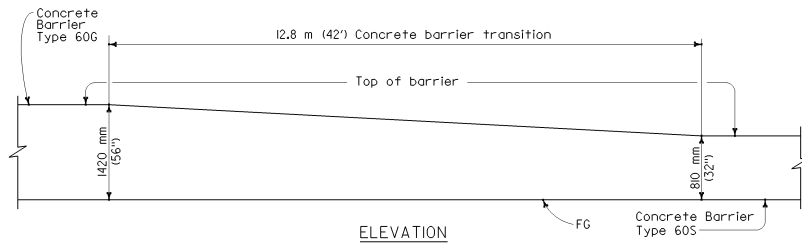
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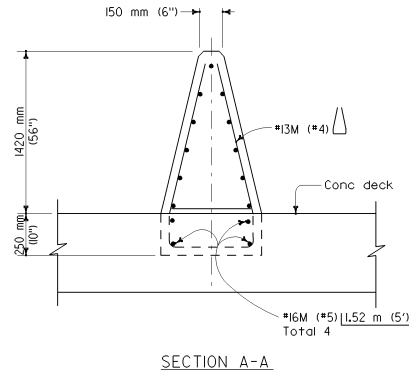
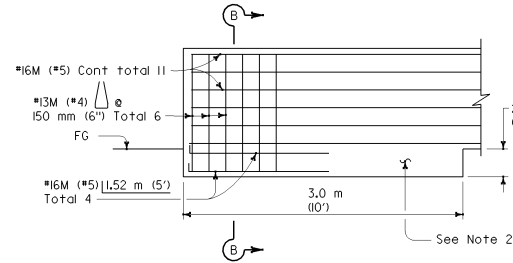
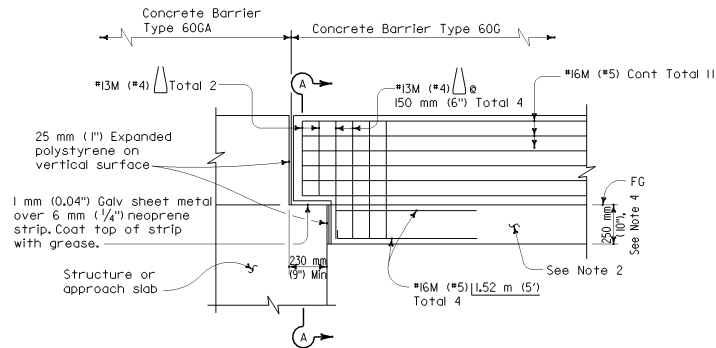
Professional Engineer Seal: Ellis K. Hirst, No. C17926, Exp. 6-30-05, State of California.



TRANSITION CONCRETE BARRIER TYPE 60G TO CONCRETE BARRIER TYPE 60



TRANSITION CONCRETE BARRIER TYPE 60G TO CONCRETE BARRIER TYPE 60S



NOTES

1. See Standard Plan A76D for Concrete Barrier Type 60G and Type 60GA.
2. Footing monolithic or doweled with 2-#25M x 205 mm ϕ 610 mm (#8 x 8" ϕ 36"). The footing is required at concrete barrier ends and at interruptions in concrete barrier.
3. Expansion joints in concrete barrier shall be located at all deck, pavement and principle wall joints. Expansion joint filler material shall be the same size as joint or 13 mm (1/2") minimum.
4. 250 mm (10") concrete barrier footing extends 3.0 m (10') back from structure.
5. See Standard Plan A78I for transition to Thrie Beam Barrier.

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION CONCRETE BARRIER TYPE 60G

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NO SCALE

A76E

DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

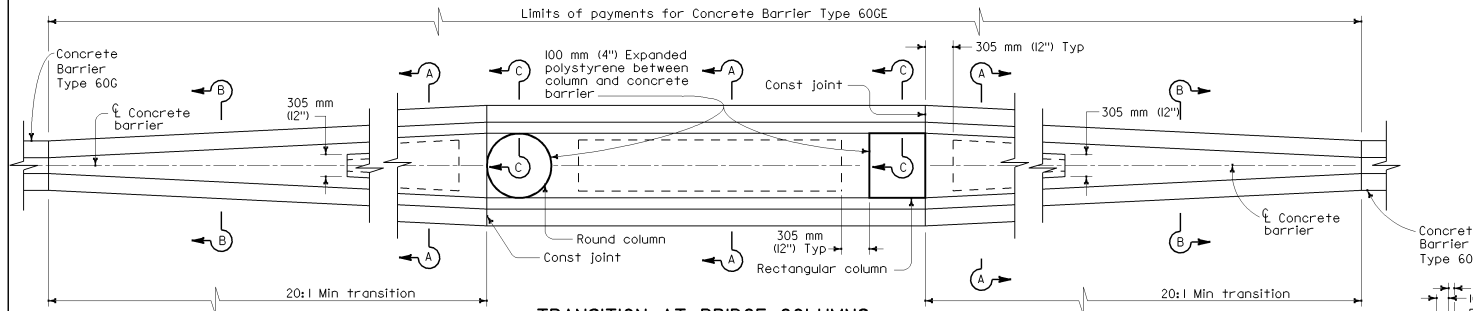
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July 1, 2002
PLANS APPROVAL DATE

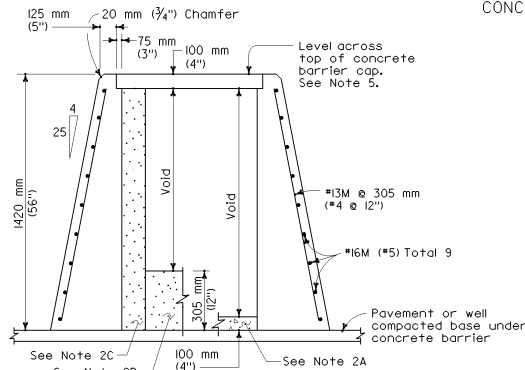
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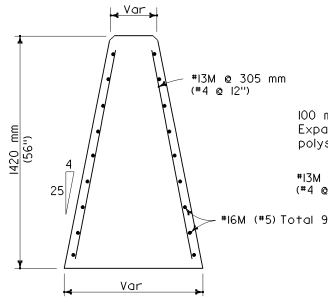
Professional Engineer
Ellis K. Hirst
No. C17926
Exp. 6-30-05
State of California



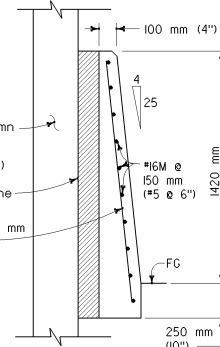
TRANSITION AT BRIDGE COLUMNS
CONCRETE BARRIER TYPE 60G



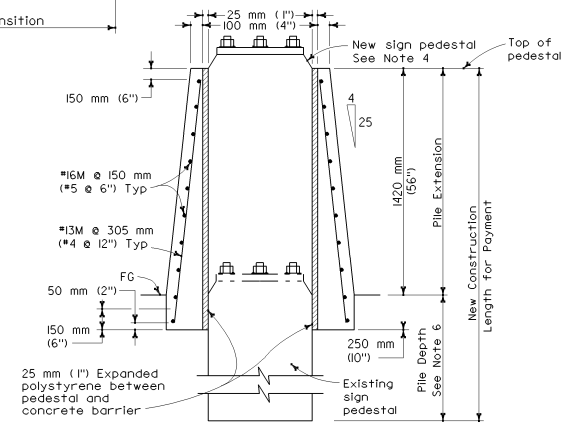
SECTION A-A



SECTION B-B



SECTION C-C



SECTION D-D

NOTES

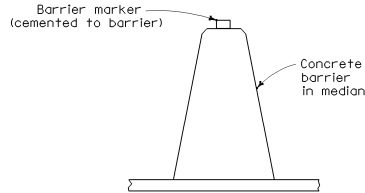
- See Standard Plan A76D for Concrete Barrier Type 60G.
- Contractor options for fill between concrete barrier walls:
 - Place 100 mm (4") PPC at base between concrete barrier walls.
 - Place 305 mm (12") of granular material at base between walls.
 - Place granular material from base to bottom of 100 mm (4") cap.
- Reinforcing steel shall extend continuous through construction joints.
- See "Overhead Sign" plans for sign pedestal elevations on new construction.
- Adjust height of concrete barrier wall on low side of offset or super-elevated roadways to provide level grade across top of concrete barrier cap.
- See Overhead Signs Standard Plan Pile Foundation Tables.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**CONCRETE BARRIER
TYPE 60G**

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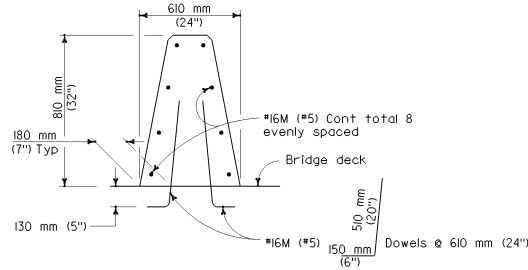
NO SCALE

A76F



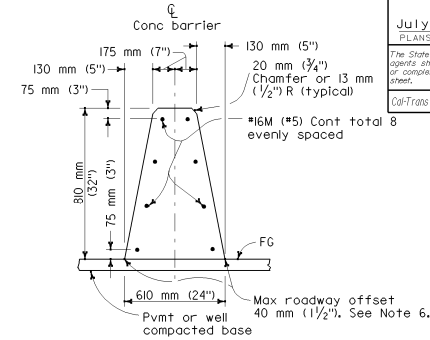
CONCRETE BARRIER TYPE 60S DELINEATION

See Notes 7 and 8

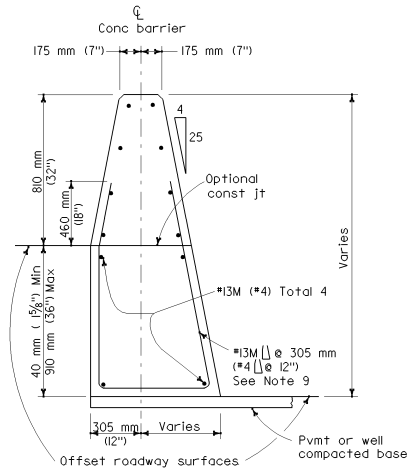


CONCRETE BARRIER TYPE 60SA

Details similar to Type 60S except as noted.



CONCRETE BARRIER TYPE 60S



CONCRETE BARRIER TYPE 60SC

Details similar to Type 60S except as noted.
Concrete barrier end anchor when necessary.

NOTES

- See Standard Plan A76H for details of Concrete Barrier Type 60S end anchors, connection to structures and transition to Concrete Barrier Type 50.
- See Standard Plan A76I for Concrete Barrier Type 60S transitions at bridge column and sign pedestals.
- Where glare screen is required on top of concrete barrier, use Concrete Barrier Type 60G.
- Where the concrete barrier is added to the face of existing concrete structure, match existing weep holes.
- Expansion joints in concrete barrier shall be located at all deck, pavement and principle wall joints. Expansion joint filler material shall be the same size as joint or 13 mm (1/2") minimum.
- Where roadway offset is greater than 40 mm (1 1/2"), see Concrete Barrier Type 60SC.
- Barrier delineation to be used when required by the Special Provisions.
- Spacing of barrier markers to match spacing of raised pavement markers on the adjacent median edgeline pavement delineation.
- Reinforcing stirrup not required for roadway offsets less than 305 mm (12").

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION CONCRETE BARRIER TYPE 60S

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NO SCALE

A76G

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
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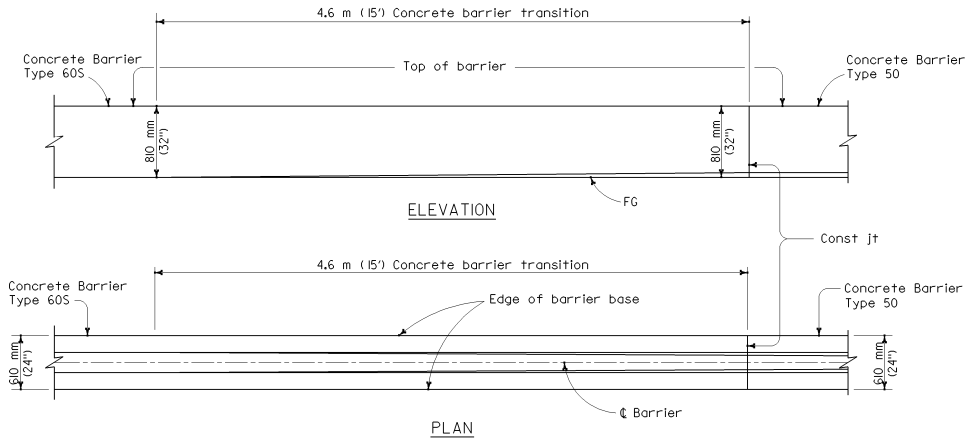
REGISTERED PROFESSIONAL ENGINEER

Ellis K. Hirst

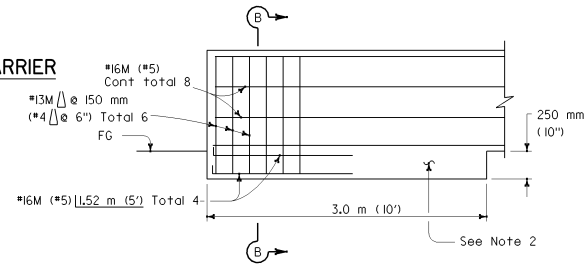
NO. C17926

EXP. 6-30-05

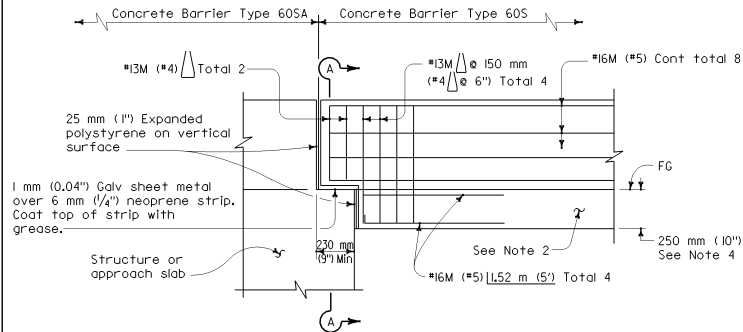
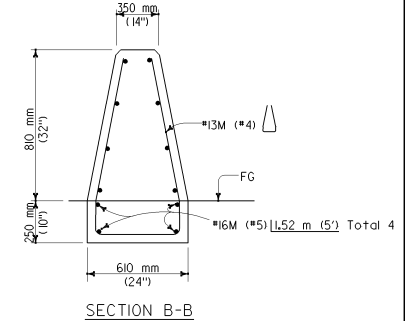
STATE OF CALIFORNIA



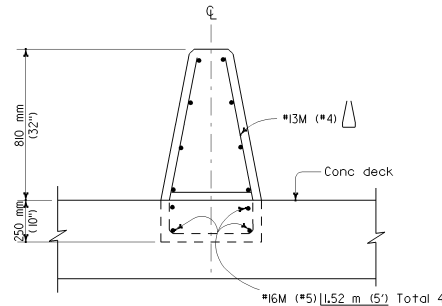
TRANSITION TYPE 60S CONCRETE BARRIER TO TYPE 50 CONCRETE BARRIER



CONCRETE BARRIER TYPE 60S CONCRETE BARRIER END ANCHORAGE



CONCRETE BARRIER TYPE 60S CONNECTION TO STRUCTURE



SECTION A-A

DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
July 1, 2002 PLANS APPROVAL DATE					
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NOTES

- See Standard Plan A76G for Concrete Barrier Type 60S and Type 60SA.
- Footing monolithic or doweled with 2- #25M x 205 mm @ 610 mm (#8 x 8" @24") the footing is required at concrete barrier ends and at interruptions in concrete barrier.
- Expansion joints in concrete barrier shall be located at all deck, pavement and principal wall joints. Expansion joint filler material shall be the same size as joint or 13 mm (1/2") minimum.
- 250 mm (10") Concrete barrier footing extends 3.0 m (10') back from structure.
- See Standard Plan A78I for transition to Thrlem Beam Barrier.

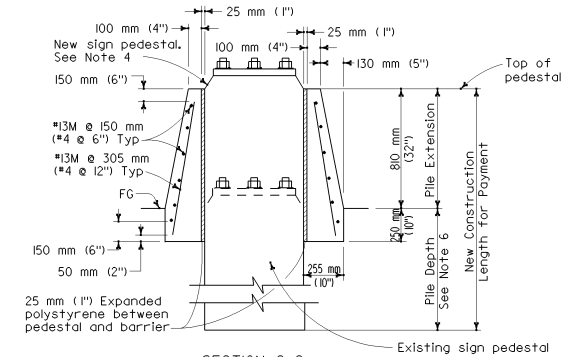
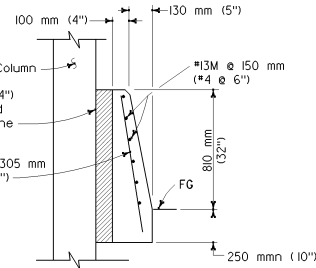
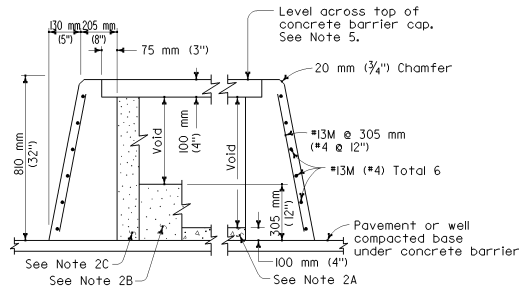
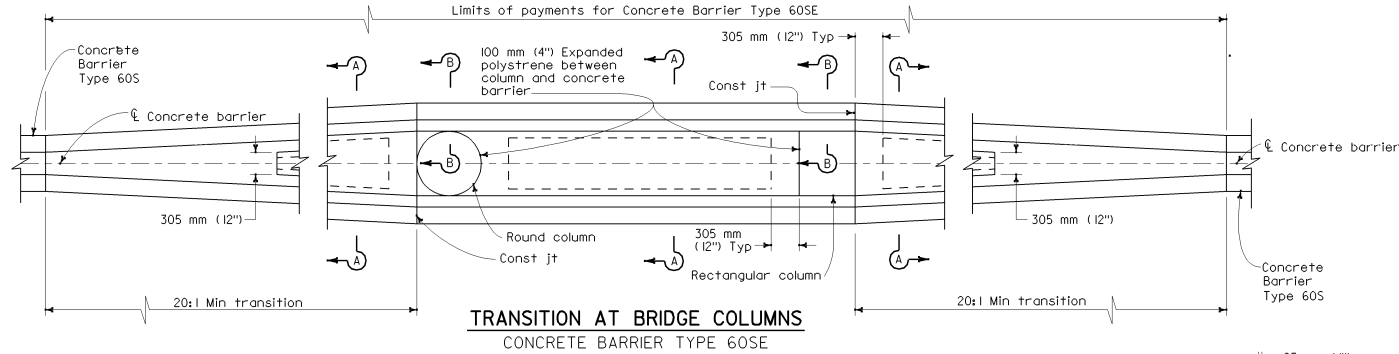
STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION CONCRETE BARRIER TYPE 60S

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NO SCALE

A76H

DIST.	COUNTY	ROUTE	POST MILES	SHEET TOTAL
			TOTAL PROJECT	NO. SHEETS
July 1, 2002 PLANS APPROVAL DATE				
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NOTES

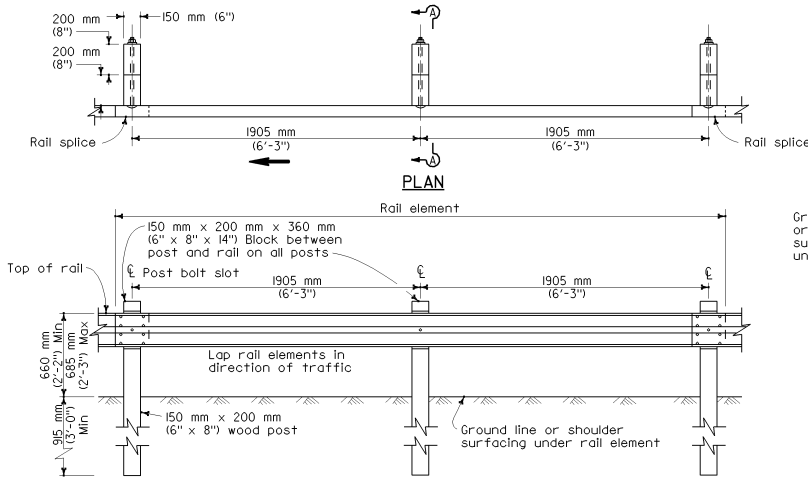
- See Standard Plan A76G for Concrete Barrier Type 60S.
- Contractor options for fill between concrete barrier walls:
 - Place 100 mm (4") PCC at base between concrete barrier walls.
 - Place 305 mm (12") of granular material at base between walls.
 - Place granular material from base to bottom of 100 mm (4") cap.
- Reinforcing steel shall extend continuous through construction joints.
- See "Overhead Sign" plans for sign pedestal elevations on new construction.
- Adjust height of concrete barrier wall on low side of offset or super-elevated roadways to provide level grade across top of concrete barrier cap.
- See Overhead Signs Standard Plan Pile Foundation Tables.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**CONCRETE BARRIER
TYPE 60SE**

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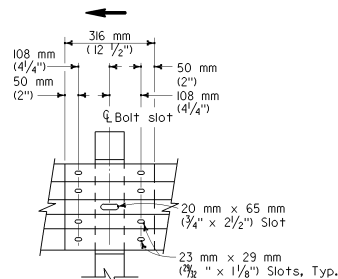
NO SCALE

A76I



ELEVATION

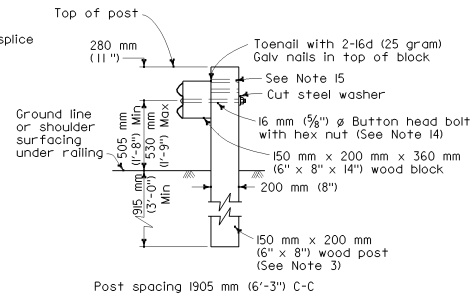
METAL BEAM GUARD RAILING WITH WOOD POST AND BLOCKS



ELEVATION

RAIL ELEMENT SPLICE DETAIL

16 mm ϕ x 35 mm ($5/8$ " ϕ x $1 3/8$ ") button head oval shoulder bolts inserted into the 23 mm x 29 mm ($7/8$ " x $1 1/8$ ") slots and bolted together with 16 mm ϕ x 35 mm ($5/8$ " ϕ x $1 3/8$ ") recessed hex nuts. Total of 8 bolts and nuts are to be used at each rail splice connection. The ends of the rail elements are to be overlapped in the direction of traffic (see details). Where a terminal section or end section is to be attached to the end of a rail element, a total of 4 of the above described splice bolts and nuts are to be used.



Post spacing 1905 mm (6'-3") C-C

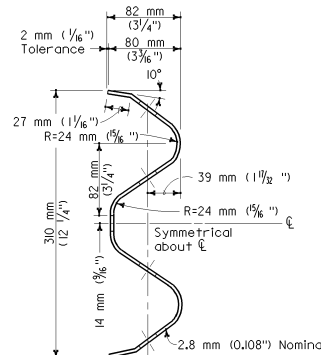
SECTION A-A

TYPICAL WOOD LINE POST INSTALLATION

See Note 4

NOTES

- For details of steel post and wood block installations, see Standard Plan A77AA.
- For details of standard hardware used to construct guard railing, see Standard Plan A77B.
- For details of wood posts and wood blocks used to construct guard railing, see Standard Plan A77C.
- For additional installation details, see Standard Plan A77FA.
- Guard railing post spacing to be 1905 mm (6'-3") center to center, except as otherwise noted.
- For guard railing typical layouts, see Standard Plans A77D and A77E.
- For embankment widening details to accommodate guard railing terminal system and treatments, see Standard Plan A77F.
- For Typical terminal system end treatments, see Standard Plans A77L, A77M and A77N. For type of terminal system to be used, see Project Plans.
- For guard railing terminal anchor details, see Standard Plans A77G, A77I and A77IA.
- For guard railing connection details to bridge railing, retaining walls and abutments, see Standard Plan A77J.
- For guard railing connection details to bridge sidewalk curbs, see Standard Plan A77K.
- For dike positioning with guard railing installations, see Standard Plan A77F.
- Direction of traffic indicated by \rightarrow .
- Where conditions require the bolt to be installed in the opposite direction from that shown in Section A-A or where a 16 mm ($5/8$ ") threaded rod is required in place of the bolt, no more than 13 mm ($1/2$ ") of thread to be exposed on the traffic side of the rail element.
- Additional holes in wood post are required for potential adjustments of railing height. See Standard Plan A77C.
- For guard railing delineation details, see Standard Plan A77F.



SECTION THRU

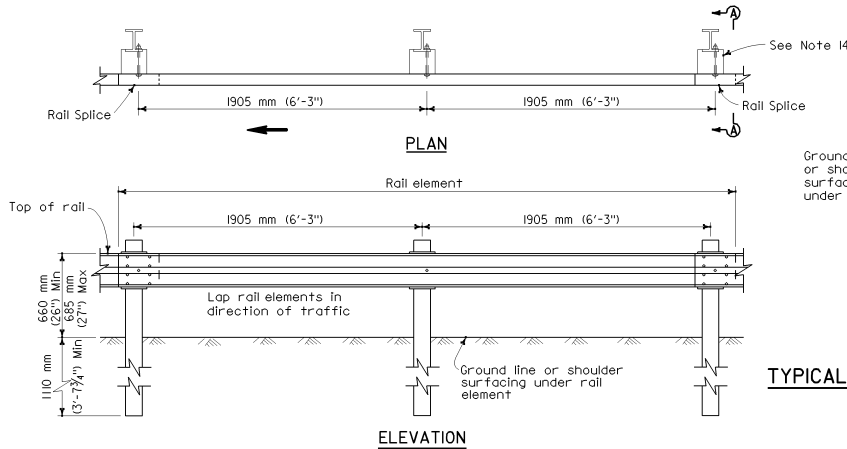
RAIL ELEMENT

METAL BEAM GUARD RAILING TYPICAL WOOD POST WITH WOOD BLOCK

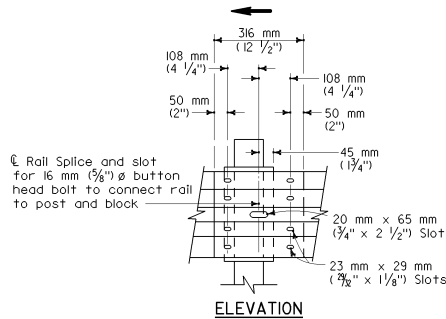
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NO SCALE

A77A

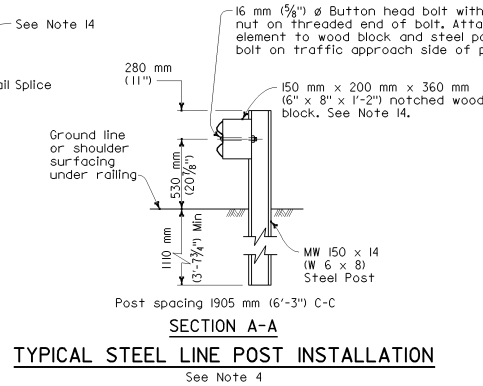


METAL BEAM GUARD RAILING WITH STEEL POSTS AND WOOD BLOCKS



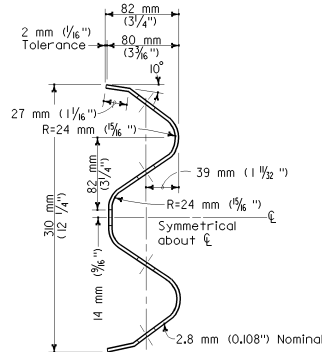
RAIL ELEMENT SPICE DETAIL

Connect the overlapped ends of the rail elements with 16 mm ϕ x 35 mm (5/8" ϕ x 1 1/4") button head oval shoulder bolts inserted into the 23 mm x 29 mm (7/8" x 1 1/8") slots and bolted together with 16 mm ϕ x 35 mm (5/8" ϕ x 1 1/4") recessed hex nuts. A total of 8 bolts and nuts are to be used at each rail splice connection. The ends of the rail elements are to be overlapped in the direction of traffic (see detail). Where a terminal section or end section is to be attached to the end of a rail element, a total of 4 of the above described splice bolts and nuts are to be used.



NOTES:

- For details of wood post and wood block installations, see Standard Plan A77A.
- For details of standard hardware used to construct guard railing, see Standard Plan A77B.
- For details of steel posts and wood blocks used to construct guard railing, see Standard Plan A77CA.
- For additional installation details, see Standard Plan A77FA.
- Guard railing post spacing to be 1905 mm (6'-3") center to center, except as otherwise noted.
- For guard railing typical layouts, see Standard Plans A77D and A77E.
- For embankment widening details to accommodate guard railing terminal system end treatments, see Standard Plan A77F.
- For typical terminal system end treatments, see Standard Plans A77L, A77M and A77N. For type of terminal system to be used, see Project Plans.
- For guard railing terminal anchor details, see Standard Plans A77G, A77H, A77I and A77J.
- For guard railing connection details to bridge railing, retaining walls and abutments, see Standard Plan A77J.
- For guard railing connection details to bridge sidewalks and curbs, see Standard Plan A77K.
- For dike positioning with guard railing installations, see Standard Plan A77F.
- Direction of traffic indicated by \rightarrow .
- Notched face of wood block faces steel post.



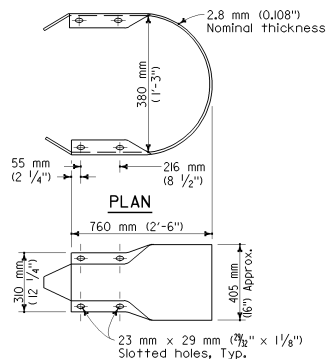
METAL BEAM GUARD RAILING TYPICAL STEEL POST WITH WOOD BLOCK

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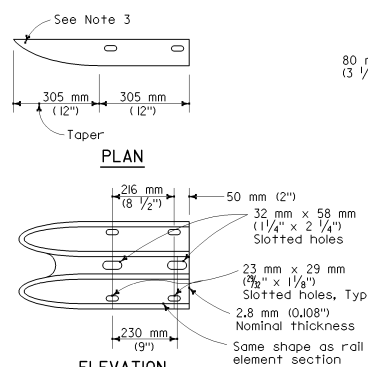
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A77AA

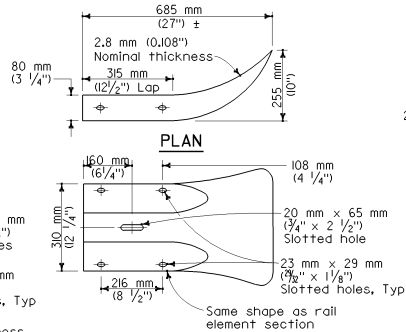
DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
 REGISTERED CIVIL ENGINEER					
July 1, 2002 PLANS APPROVAL DATE					
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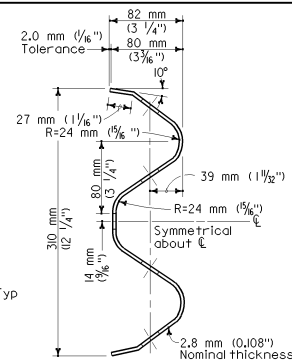
RETURN SECTION



END SECTION DETAILS



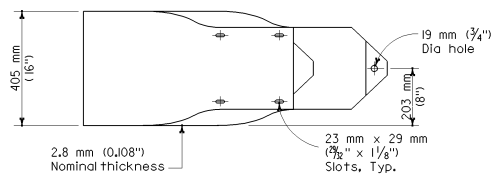
**TERMINAL SECTION
(TYPE B)**



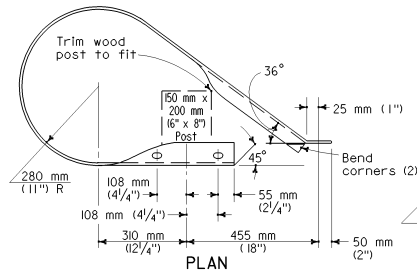
**SECTION THRU
RAIL ELEMENT**

NOTES

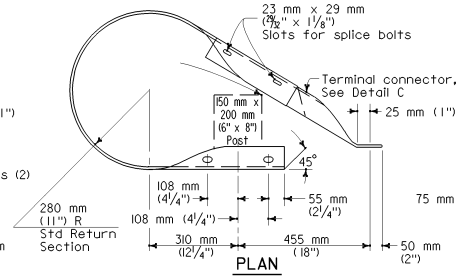
1. Terminal sections not to be installed on the trailing end of guard railing constructed adjacent to one-way roadways.
2. For use and details of back-up plates, see Standard Plans A77J and A77K.
3. End Section may be cut from Terminal Section (Type B) or fabricated.
4. Use for nested railing applications.
5. Terminal Section "Type A" has been deleted.
6. Use flat plate washer where indicated on plans.



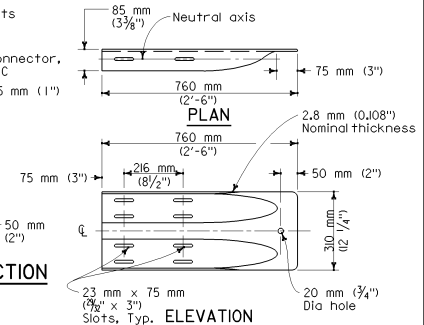
**TERMINAL SECTION
(TYPE C)**



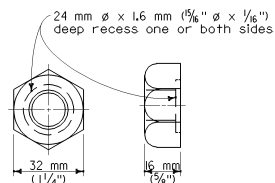
**TERMINAL SECTION
(TYPE C)
DETAIL A**



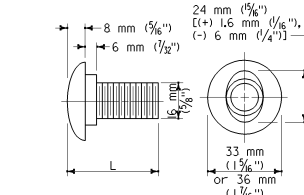
**OPTIONAL DESIGN TERMINAL SECTION
(TYPE C)
DETAIL B**



**TERMINAL CONNECTOR FOR
OPTIONAL DESIGN TERMINAL SECTION
(TYPE C)
DETAIL C**



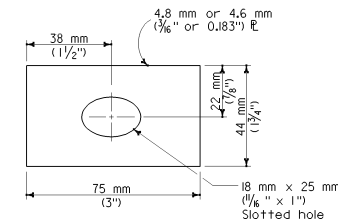
16 mm (5/8 inch) Ø RECESS NUT



16 mm (5/8 inch) Ø BUTTON HEAD BOLT

L	THREAD LENGTH
35 mm (1 3/8 inch)	full thread length
50 mm (2 inch)	full thread length
255 mm (10 inch)	100 mm (4 inch) Min thread length
460 mm (18 inch)	100 mm (4 inch) Min thread length
••70 mm (2 3/4 inch)	50 mm (2 inch) Min thread length
••480 mm (19 inch)	100 mm (4 inch) Min thread length

•• SEE NOTE 4



FLAT PLATE WASHER


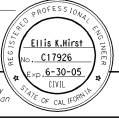
See Note 6

METAL BEAM GUARD RAILING STANDARD HARDWARE

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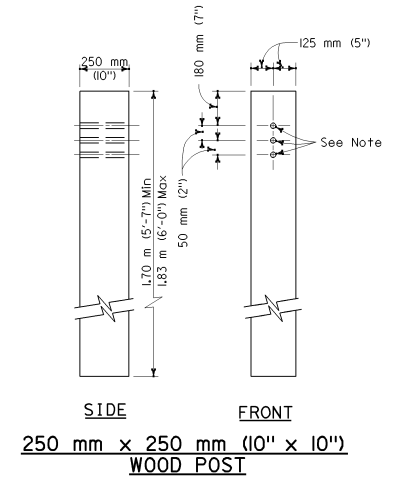
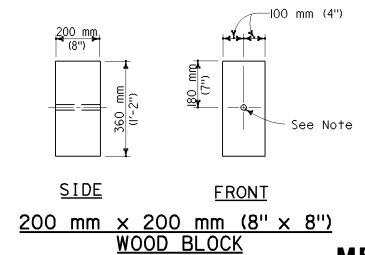
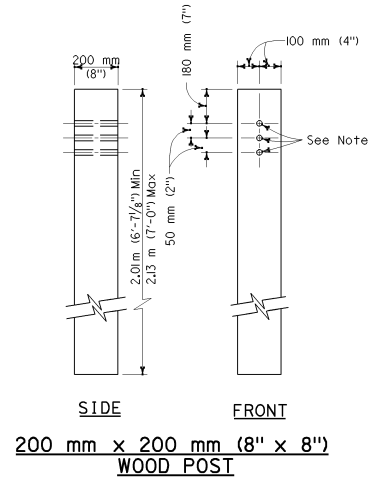
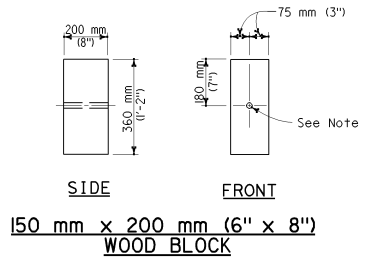
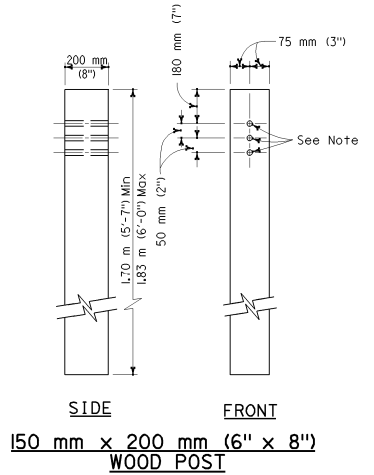
NO SCALE

A77B

DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
 REGISTERED CIVIL ENGINEER					
July 1, 2002 PLANS APPROVAL DATE					
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NOTES:

- All holes in wood posts and blocks shall be 20 mm dia \pm 1.6 mm ($\frac{3}{4}$ " dia \pm $\frac{1}{16}$ ").
- Dimensions shown for wood post are nominal.

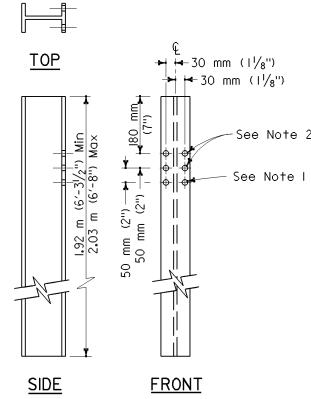


STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
METAL BEAM GUARD RAILING
WOOD POST AND
WOOD BLOCK DETAILS

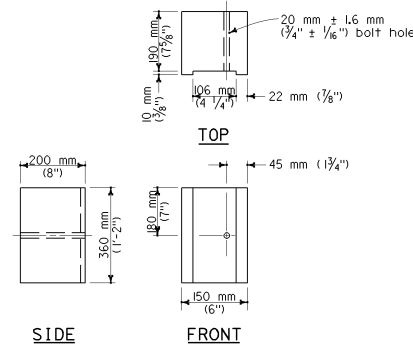
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NO SCALE

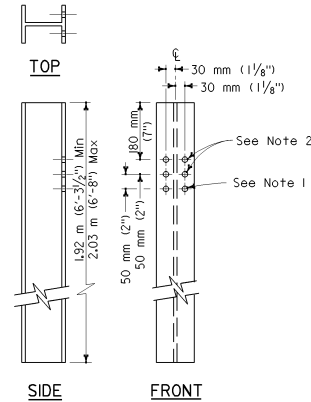
A77C



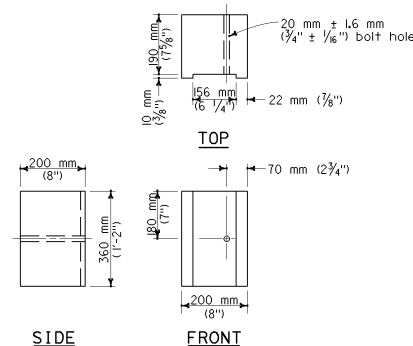
MW 150 x 14 (W6 x 8.5 or W6 x 9)
STEEL POST



150 mm x 200 mm (6" x 8")
NOTCHED WOOD BLOCK
See Notes 3 and 4



MW 150 x 22 (W6 x 15)
STEEL POST



200 mm x 200 mm (8" x 8")
NOTCHED WOOD BLOCK
See Notes 3 and 4

DIST.	COUNTY	ROUTE	POST MILES	SHEET TOTAL
			TOTAL PROJECT	NO. SHEETS

Ellis K. Hirst
REGISTERED CIVIL ENGINEER

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SEAL OF THE PROFESSIONAL ENGINEER
Ellis K. Hirst
No. C17926
Exp. 6-30-05
STATE OF CALIFORNIA

NOTES:

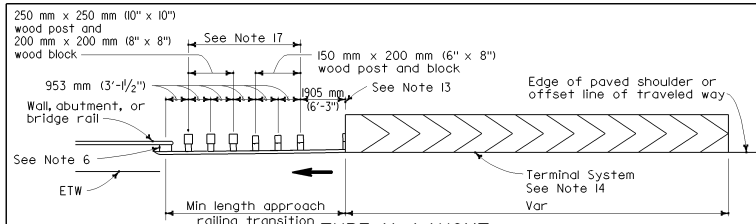
1. All holes in steel post shall be 21 mm (3/4") dia maximum.
2. Additional holes in steel post are required for potential adjustments of railing heights.
3. Dimensions shown for wood block are nominal.
4. Notched face of wood block faces steel post.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
METAL BEAM GUARD RAILING
STEEL POST AND
WOOD BLOCK DETAILS

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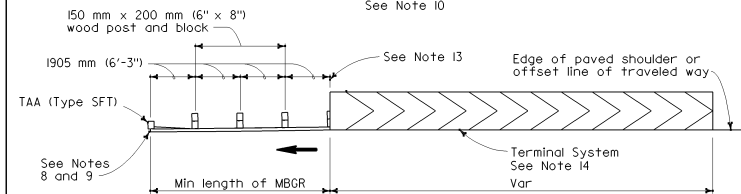
NO SCALE

A77CA



TYPE 1A LAYOUT

(TYPICAL STRUCTURE APPROACH INSTALLATION)
See Note 10

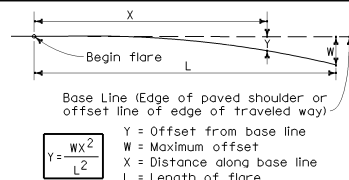


TYPE 1B LAYOUT

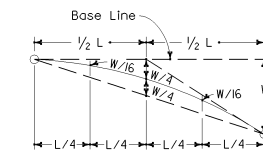
(TYPICAL EMBANKMENT INSTALLATION)
See Note 10

NOTES

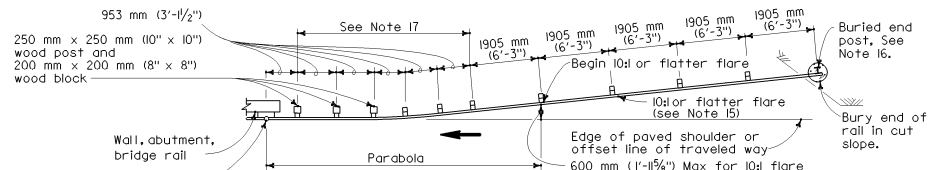
- Post, blocks and hardware to be used are shown on Standard Plans A77B, A77C and A77CA.
- Guard rail post spacing to be 1905 mm (6'-3") center to center, except as otherwise noted.
- Except as noted, posts shown are 150 mm x 200 mm (6' x 8") wood, MW 150 mm x 14 mm (W6 x 8.5 or W6 x 9) steel post with 200 mm x 200 mm (8' x 8") notched wood blocks may be used for 150 mm x 200 mm wood posts and blocks where applicable and when specified.
- Rail elements to be installed as shown on Standard Plan A77A for wood post and wood blocks installations and as shown on Standard Plan A77AA for steel post and wood block installations.
- Direction of traffic indicated by .
- For connection details, see Standard Plans A77J or A77K.
- For terminal anchor assembly (Type CA) details, see Standard Plan A77I. Where a crash cushion is required as specified in Note 11 and the crash cushion attaches to the ends of the guard railing, the terminal anchor assembly (Type CA) and return section may not be required (see Project Plans).
- For terminal anchor assembly (Type SFT) details, see Standard Plan A77G. Terminal Sections not to be installed on trailing end of guard railing constructed adjacent to one-way roadways.
- On two-way roadways less than 18 m (60') in width, a terminal system is to be used in place of the terminal anchor assembly (Type SFT) at the trailing end of guard railing for embankment installations.
- For details of a terminal system typically used as a flared end treatment on Type 1A and Type 1B Layouts, see Standard Plan A77L. For details of terminal system typically used on Type 1A and Type 1B Layouts where site conditions will not accommodate a flared end treatment, see Standard Plans A77M and A77N. For embankment widening details to accommodate terminal system end treatment, see Standard Plan A77F.
- A crash cushion is required for Type 3A layout, when the end of the guard railing is within 9.0 m (30') of the edge of traveled way (ETW) of approaching traffic. For the type of crash cushion to be used, see Project Plans and Special Provisions.
- When width "W" exceeds 3.8 m (12'-6") to calculate the length of parabolic flare, use "L=3W" and round to nearest 3.8 m (12'-6").
- As site conditions dictate, additional 3.8 m (12'-6") lengths of guard railing with post spacing at 1905 mm (6'-3") may be required at the point shown.
- For the type of terminal system to be used, see Project Plans and the Special Provisions.
- The 10d or flatter flare is based on the edge of the paved shoulder or offset line of edge of traveled way. The length of guard railing within the 10d or flatter flare may be increased by 3.8 m (12'-6") lengths, as site conditions dictate.
- For buried end anchor details, see Standard Plan A77IA.
- Use a flat plate washer on the rail face when attaching rail element to these post. Wood post with wood block are only to be used for these posts and blocks.



PARABOLIC FLARE OFFSETS

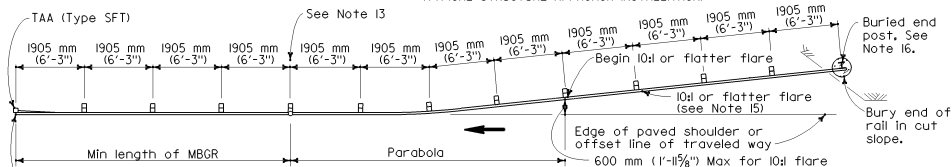


TYPICAL PARABOLIC LAYOUT



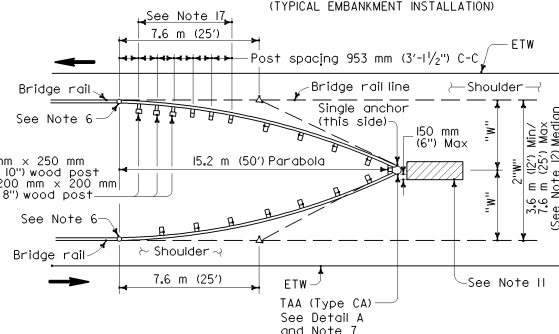
TYPE 2A LAYOUT

(TYPICAL STRUCTURE APPROACH INSTALLATION)

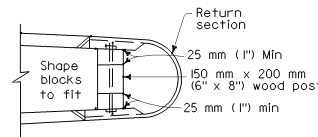


TYPE 2B LAYOUT

(TYPICAL EMBANKMENT INSTALLATION)



TYPE 3A LAYOUT



DETAIL A

METAL BEAM GUARD RAILING TYPICAL LAYOUTS

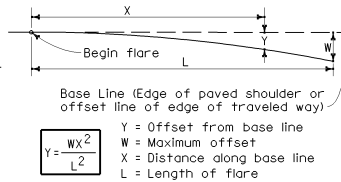
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NO SCALE

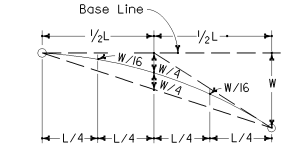
A77D

NOTES

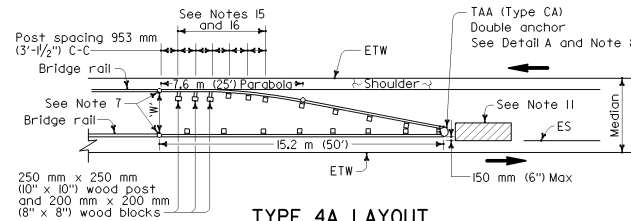
- Post, blocks and hardware to be used are shown on Standard Plans A77B, A77C and A77CA.
- Guard rail post spacing to be 1905 mm (6'-3") center to center, except as otherwise noted.
- Except as noted, posts and blocks shown are 150 mm x 200 mm (6" x 8") wood, MW 150 mm x 14 mm (W6 x 8.5 or W6 x 9) steel post with 200 mm x 200 mm (8" x 8") notched wood blocks may be used for 150 mm x 200 mm (6" x 8") wood posts and blocks where applicable and when specified.
- Rail elements to be installed as shown on Standard Plan A77A for wood post and wood blocks installations and as shown on Standard Plan A77AA for steel post and wood block installations.
- A 1.2 m (4') minimum clearance is required between the face of the railing and the face of a fixed object located directly behind a guard railing post. Where a fixed object is behind the railing, but not directly behind a guard railing post, a 90 mm (3") minimum clearance is required between the face of the railing and the face of the fixed object. Where minimum clearances cannot be obtained, construct guard railing as shown in "Approach Railing Transition Details for Fixed Objects" on this plan.
- Direction of traffic indicated by \rightarrow .
- For connection details, see Standard Plans A77J or A77K.
- For terminal anchor assembly (Type CA) details, see Standard Plan A77I. Where a crash cushion is required as specified in Note 11 and the crash cushion attaches to the ends of the guard railing, the terminal anchor assembly (Type CA) and return section may not be required (see Project Plans).
- For terminal anchor assembly (Type SFT) details, see Standard Plan A77G.
- Terminal sections not to be installed on trailing end of guard railing constructed adjacent to one-way roadways.
- A crash cushion is required for Type 4A, 5A and 6A layouts, when the end of the guard railing is within 9.0 m (30') of the edge of traveled way (ETW) of approaching traffic. For the type of crash cushion to be used, see Project Plans and the Special Provisions.
- When width "W" exceeds 3.8 m (12'-6"), to calculate the length of parabolic flare, use "L=3W" and round to nearest 3.8 m (12'-6").
- For the type of terminal system to be used, see Project Plans and the Special Provisions.
- For details of a terminal system typically used as a flared end treatment on Type 8A Layouts, see Standard Plans A77L. For details of a terminal system typically used on a Type 8A Layouts where site conditions will not accommodate a flared end, see Standard Plans A77M and A77N.
- Use a flat plate washer on the rail face when attaching rail element to these posts.
- Wood post with wood block are only to be used for these posts and blocks.



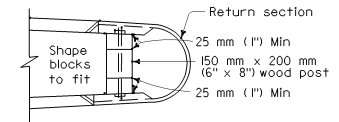
PARABOLIC FLARE OFFSETS



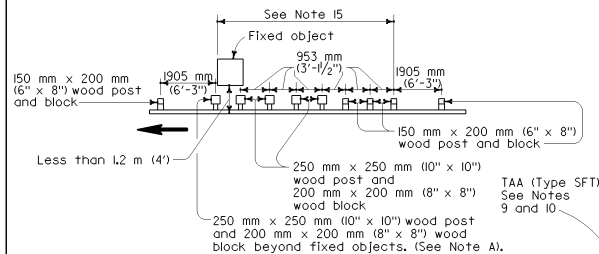
TYPICAL PARABOLIC LAYOUT



TYPE 4A LAYOUT



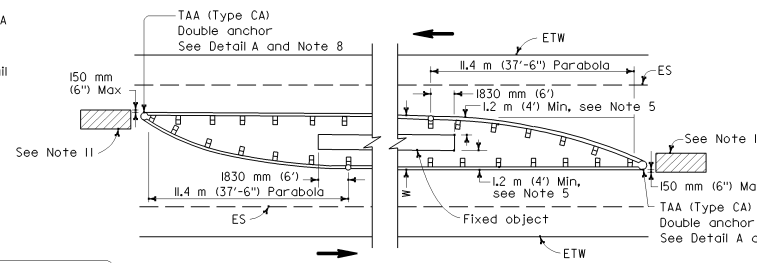
DETAIL A



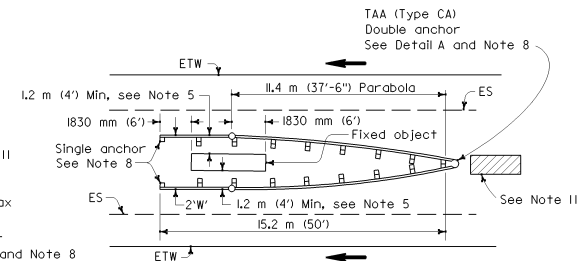
Note A. For a series of fixed objects (bridge columns, overhead sign supports, etc.) additional 250 mm x 250 mm (10" x 10") wood post with 200 mm x 200 mm (8" x 8") wood blocks and 953 mm (3'-1 1/2") center to center spacing are to be used between fixed objects.

APPROACH RAILING TRANSITION DETAIL FOR FIXED OBJECT

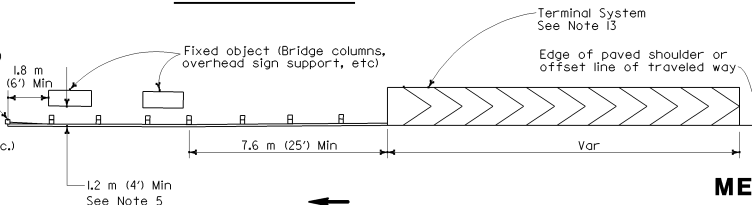
Use with Type 5A, 6A and 8A layouts where minimum clearance specified in Note 5 cannot be obtained between the face of the guard railing and the fixed object(s).



TYPE 5A LAYOUT



TYPE 6A LAYOUT



TYPE 8A LAYOUT

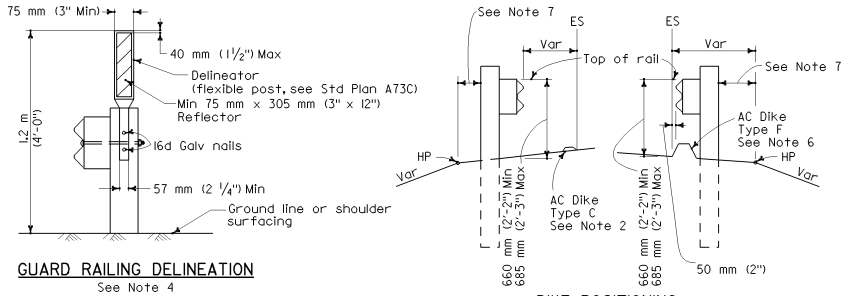
See Note 14

METAL BEAM GUARD RAILING TYPICAL LAYOUTS

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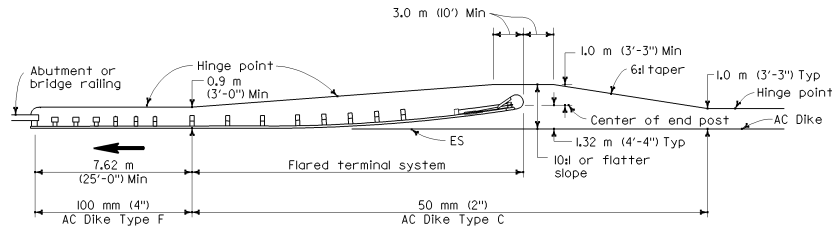
NO SCALE

A77E



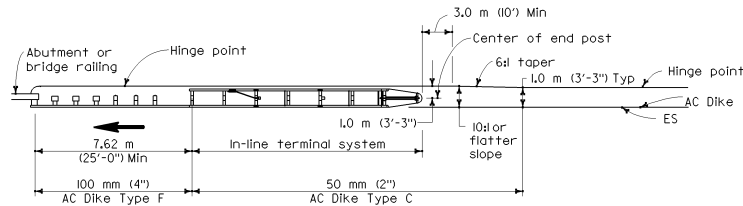
NOTES

- For guard railing layout details, see Standard Plans A77D and A77E.
- When necessary to place dike in front of face of guard railing, only Type C dike may be used. For dike details, see Standard Plan A87.
- For standard railing post embedment, see Standard Plan A77FA.
- Guard railing delineation to be used where shown on the project plans.
- Direction of traffic indicated by \rightarrow .
- When dike or curb is placed under guard railing, the maximum height of the dike or curb shall be 100 mm (4"). For dike and curb details, see Standard Plan A87.
- For details of distance between the face of rail and hinge point, see Standard Plan A77FA.
- When Terminal System (Type ET) is used, a traffic approach flare of 50d is required for the terminal system. See Standard Plan A77M.



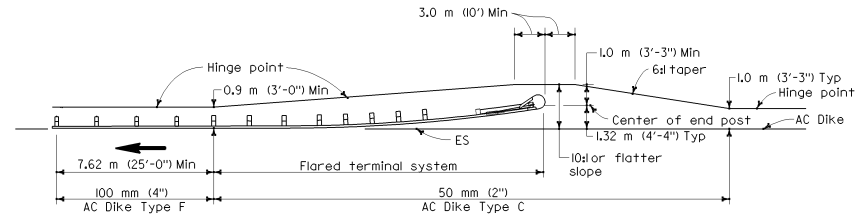
**TYPICAL STRUCTURE APPROACH
EMBANKMENT WIDENING AND DIKE PLACEMENT
FOR FLARED END TREATMENT**

See Notes 1 and 2



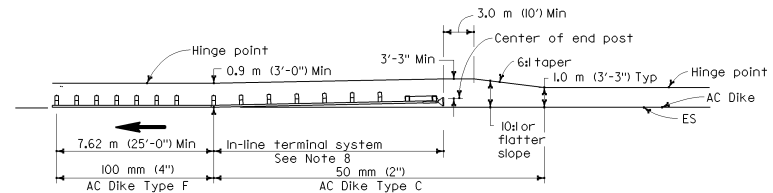
**TYPICAL STRUCTURE APPROACH
EMBANKMENT WIDENING AND DIKE PLACEMENT
FOR IN-LINE END TREATMENT**

See Notes 1 and 2



**TYPICAL ROADWAY EMBANKMENT
WIDENING AND DIKE PLACEMENT
FOR FLARED END TREATMENT**

See Notes 1 and 2



**TYPICAL ROADWAY EMBANKMENT
WIDENING AND DIKE PLACEMENT
FOR IN-LINE END TREATMENT**

See Notes 1 and 2

METAL BEAM GUARD RAILING TYPICAL EMBANKMENT WIDENING FOR END TREATMENTS

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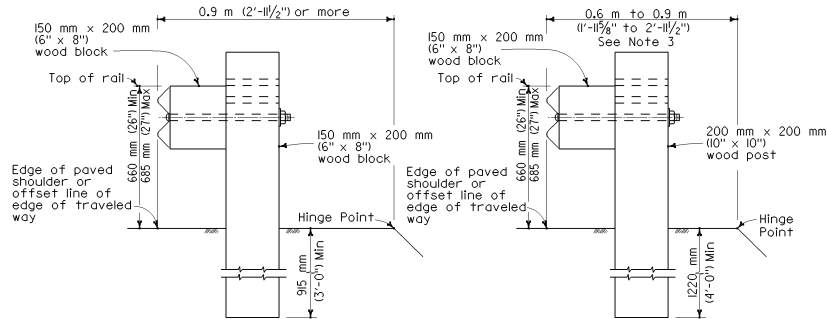
NO SCALE

A77F

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER
 July 1, 2002
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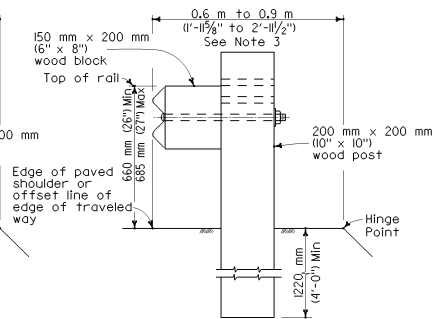
Ellis K. Hirst
 ELLIS K. HIRST
 No. C17926
 6-30-05
 STATE OF CALIFORNIA



DETAIL A
TYPICAL ROADWAY
INSTALLATION

See Note 1

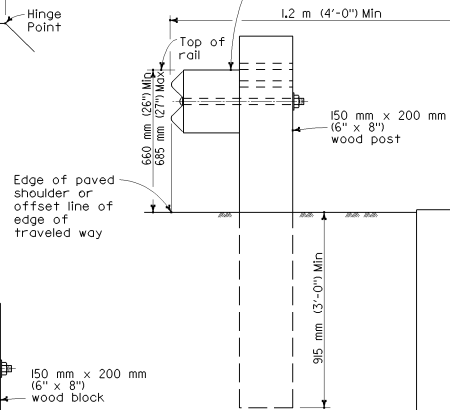
POST EMBEDMENT



DETAIL B
NARROW ROADWAY
INSTALLATION

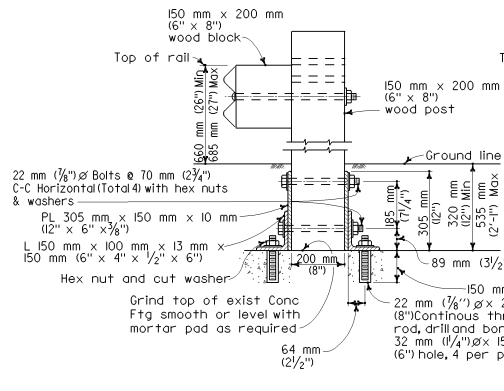
See Note 1

Edge of paved
shoulder or
offset line of
edge of
traveled way



DETAIL E

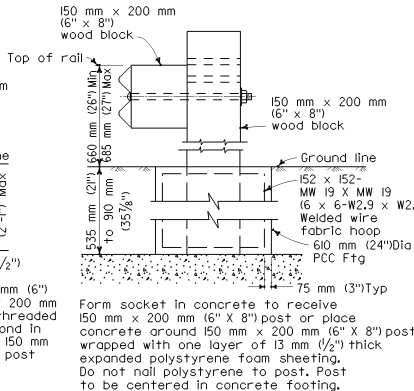
INSTALLATION AT
EARTH RETAINING WALLS



DETAIL C

SPECIAL
POST FOOTINGS

See Note 4



DETAIL D

NOTES:

- For additional installation details, see Standard Plans A77A and A77AA.
- For additional details of wood post and blocks, see Standard Plan A77C.
- Where the distance between the face of the rail and the hinge point is less than 0.6 m (1'-11 1/8"), see the Project Plans for special details.
- Use these post footings only where standard embedment of railing post as shown in Details A and B is restricted by underground concrete facilities such as footing of walls, columns, etc.
- For dike positioning with guard railing installations, see Standard Plan A77F.

DIST.	COUNTY	ROUTE	POST MILES	SHEET TOTAL
			TOTAL PROJECT	NO. SHEETS

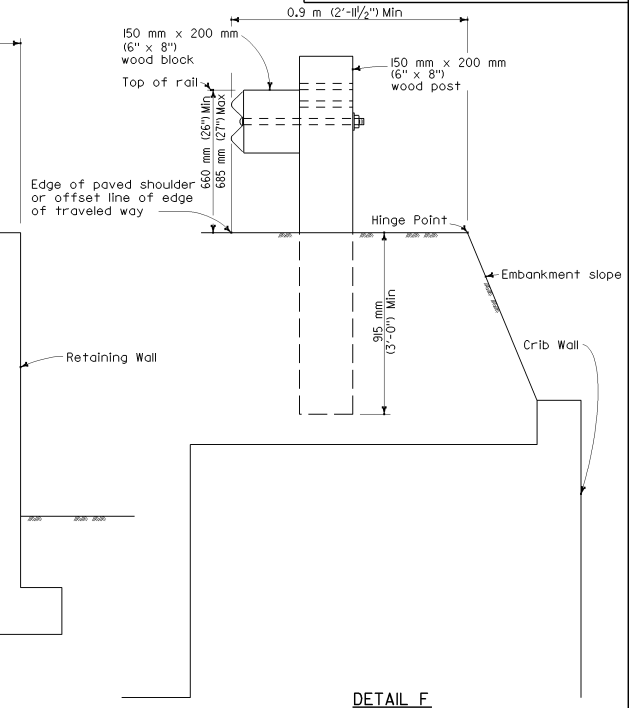
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TITLE



DETAIL F

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
METAL BEAM GUARD RAILING
TYPICAL LINE POST
INSTALLATION

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NO SCALE

A77FA



DIST.	COUNTY	ROUTE	POST MILES	SHEET TOTAL
			TOTAL PROJECT	NO. SHEETS

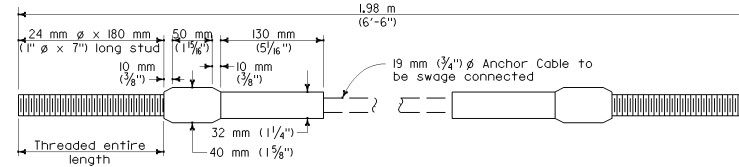
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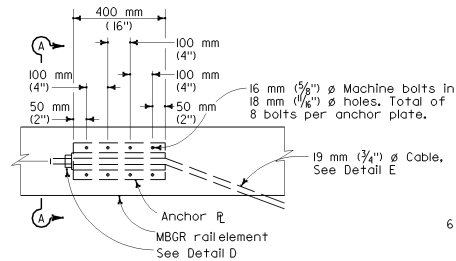
SEAL: *Ellis K. Hirst*
No. C17926
Exp. 6-30-05
STATE OF CALIFORNIA



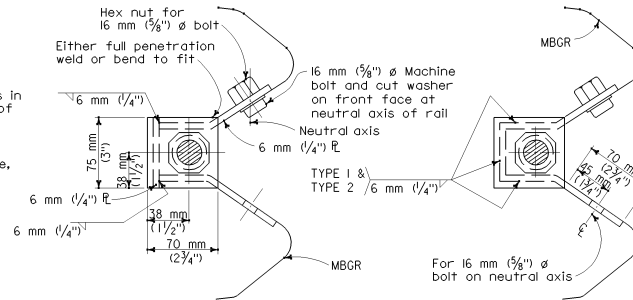
**ANCHOR CABLE WITH
SWAGED FITTING AND STUD**
DETAIL E

NOTE

- See Standard Plan A77G for typical use of anchor cable and anchor plate with Breakaway Terminal Anchor Assembly.



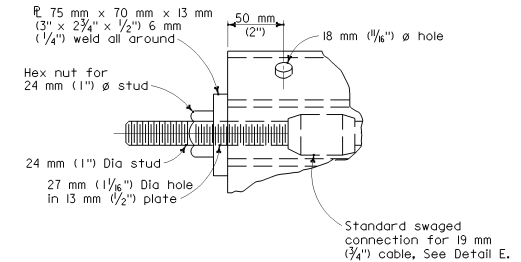
ANCHOR PLATE DETAIL



NOTE: Dimensioning applies to both types.

SECTION A-A
(ALTERNATIVE TYPE 1)

SECTION A-A
(ALTERNATIVE TYPE 2)



DETAIL D

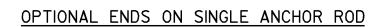
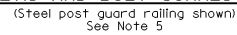
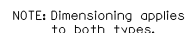
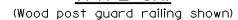
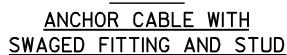
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METAL BEAM GUARD RAILING ANCHOR CABLE AND ANCHOR PLATE DETAILS

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NO SCALE

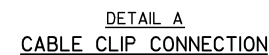
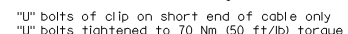
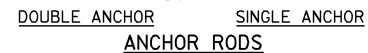
A77H



(Not to be used for double anchors)

NOTE

Use two 32 mm (1 1/4")



See Note 5

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**METAL BEAM GUARD RAILING
END TREATMENT
TERMINAL ANCHOR ASSEMBLY
(TYPE CA)**

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NO SCALE

A77I

DIST. COUNTY		ROUTE	POST MILES TOTAL PROJECT	SHEET TOTAL NO. SHEETS

Ellis K. Hirst


REGISTERED CIVIL ENGINEER

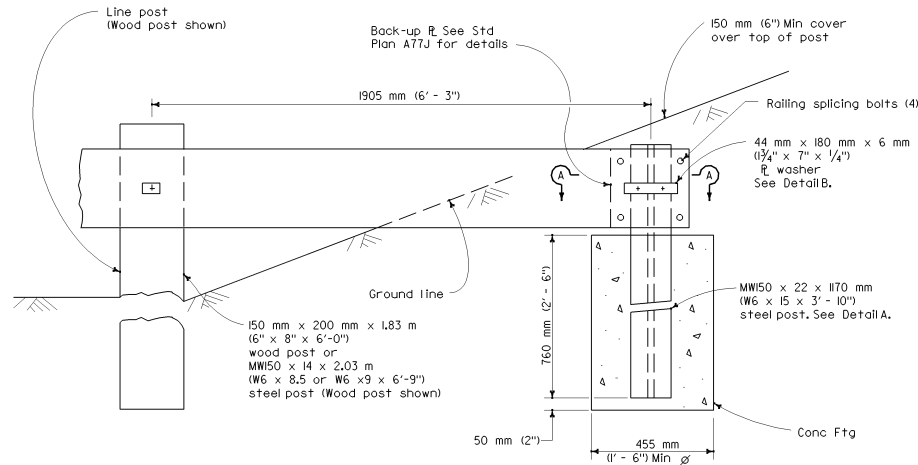
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16

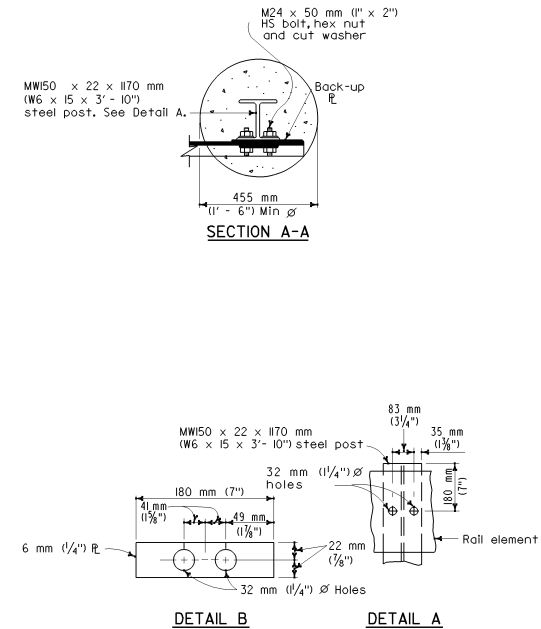




BURIED POST ANCHOR

NOTES

1. For typical use of this terminal anchor, see guard rolling Layout Types 2A and 2B on Standard Plans A77D and A77E.



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**METAL BEAM GUARD RAILING
END TREATMENT
BURIED POST ANCHOR**

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NO SCALE

A77IA

DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

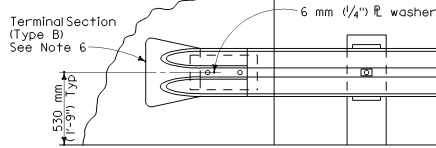
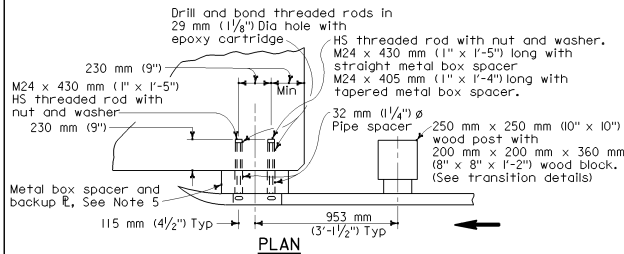
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GUARD RAILING END CONNECTION TO WALL OR ABUTMENT FACE

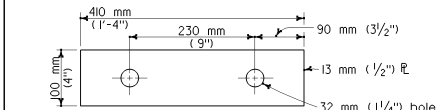


PLATE WASHER

(For backside of bridge railing)

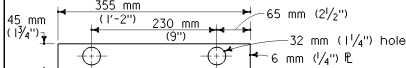
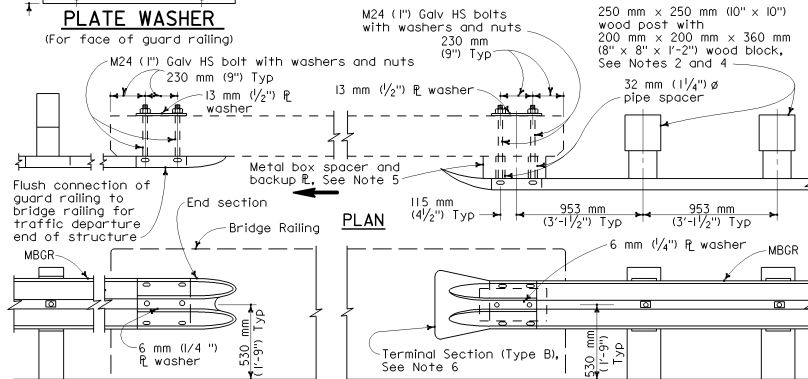


PLATE WASHER

(For face of guard railing)

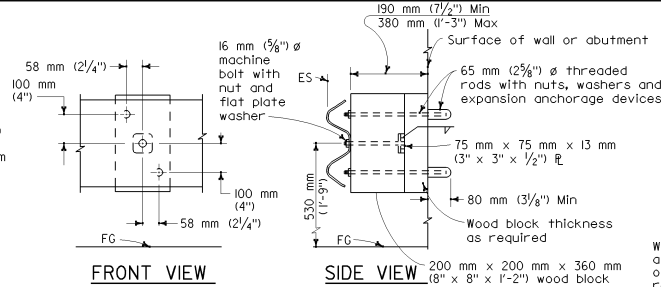


CONNECTION DETAIL B

See Note 7

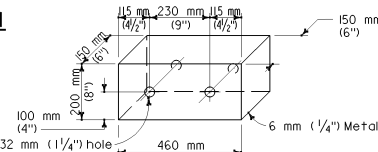
ELEVATION

GUARD RAILING CONNECTION TO BRIDGE RAILING



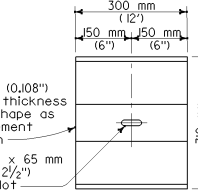
GUARD RAILING ANCHORAGE TO WALL OR ABUTMENT FACE

(Use this type of anchorage where guard railing is required across face of wall or abutment)
See Notes 8 and 9



STRAIGHT METAL BOX SPACER

Use where approach guard railing is parallel to bridge railing, wall or abutment face at the point of connection.
See Note 5

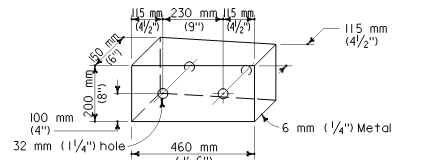


BACK-UP PLATE

For use between guard rail element and metal box spacer.

APPROACH RAILING TRANSITION

Wood post and blocks



TAPERED METAL BOX SPACER

Use where approach guard railing is not parallel to bridge railing, wall or abutment face at the point of connection.
See Note 5

NOTES

- These connection details apply to bridge railings, abutments and retaining walls. For additional connection details for bridge railing, see Standard Plans BII-53, BII-54, BII-55 and BII-56 and the project plans. See Standard Plan A77K for connection details to bridges with sidewalks or curbs.
- Additional details of post, blocks and hardware are shown on Standard Plans A77B, A77C and A77CA.
- Direction of traffic indicated by →.
- For traffic approach railing details, see Standard Plans A77D, A77E and the "Approach Railing Transition Details" on this sheet.
- When metal box spacer is installed, place M24 (1") bolts through 32 mm ϕ x 125 mm (1 1/4" ϕ x 5") and 32 mm ϕ x 100 mm (1 1/4" ϕ x 4") pipe spacers within tapered box spacer and place M24 (1") bolts through 32 mm ϕ x 130 mm (1 1/4" ϕ x 5 1/4") pipe spacers within straight box spacer.
- Terminal sections not to be installed on trailing end of approach guard railing constructed adjacent to one-way roadways. When terminal section is not installed, use backup plate between rail element and metal box spacer. See Standard Plan A77B for backup plate details.
- In addition to the use of "Connection Detail B" for traffic departure ends of structure, "Connection Detail B" shall be used on the traffic approach ends of structure on two-way roadways which are 18 m (60') or less in width. Where "Connection Detail B" is used at the traffic approach ends of structures, the size and spacing of posts and blocks shall be as shown in the "Approach Railing Transition" detail on this sheet.
- Use timber shims without posts where clearance between rail element and wall or abutment is less than 380 mm (1'-3").
- Do not attach railing to bridge columns. Use separate posts as shown on Standard Plan A77E.
- Use a flat plate washer on the rail face when attaching rail element to these post. Wood post with wood block are only to be used for these posts and blocks.

METAL BEAM GUARD RAILING CONNECTIONS TO BRIDGE RAILINGS, RETAINING WALLS AND ABUTMENTS

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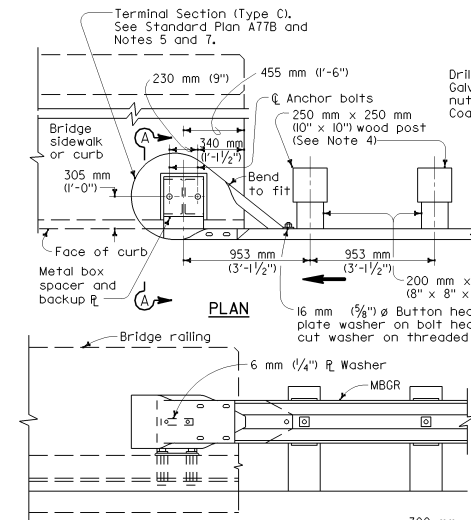
NO SCALE

A77J

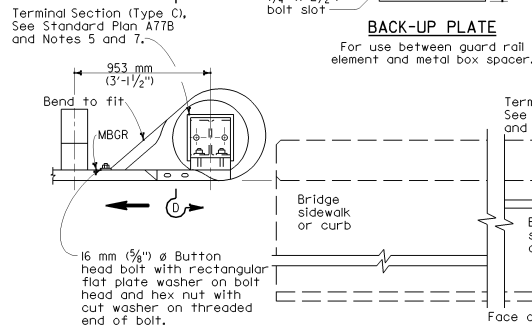
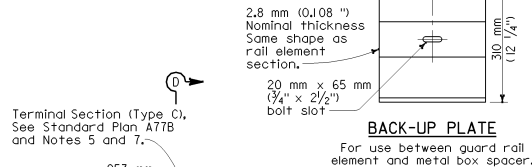
DIST.	COUNTY	ROUTE	POST MILES	SHEET TOTAL
			TOTAL PROJECT	NO. SHEETS

July 1, 2002
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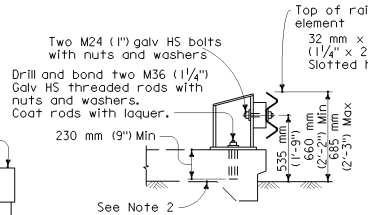
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**ELEVATION
CONNECTION DETAIL C**
See Note 2



**PLAN
CONNECTION DETAIL E**
See Note 9



**SECTION A-A
Terminal Section (Type C)
not shown**

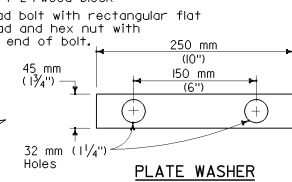
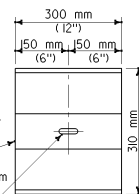
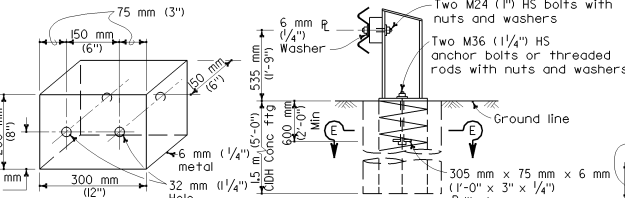


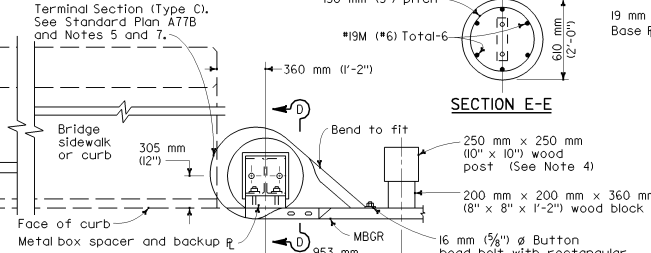
PLATE WASHER



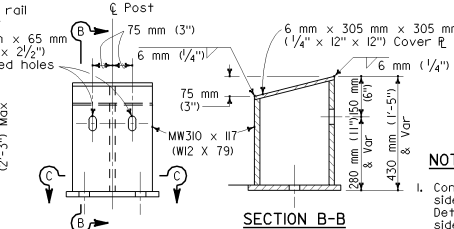
BACK-UP PLATE
For use between guard rail element and metal box spacer.



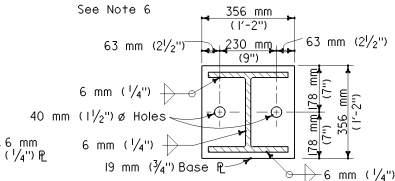
METAL BOX SPACER
Place M24 (1\"/>



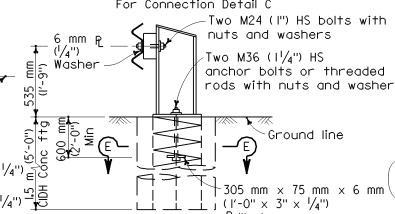
**PLAN
CONNECTION DETAIL D**



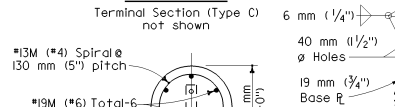
ANCHOR POST ASSEMBLY
See Note 6



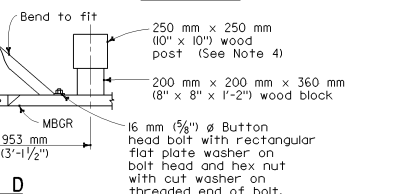
**SECTION C-C
ANCHOR POST DETAILS**
For Connection Detail C



SECTION D-D
Terminal Section (Type C)
not shown

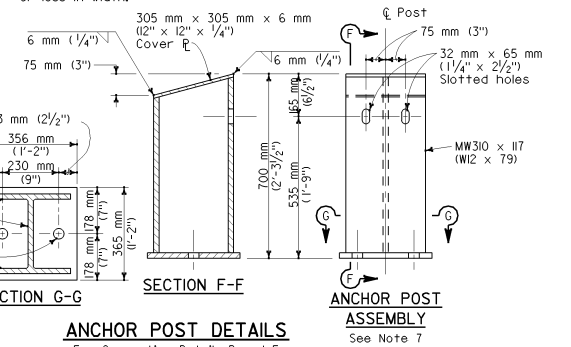


SECTION E-E



NOTES

1. Connection Details C and D applies to the traffic approach end of bridges with sidewalks or curbs. For traffic departure end of bridges, see Connection Detail E. See Standard Plan A77J for connection details to bridges without sidewalks or curbs.
2. When curb or sidewalk depth is less than 230 mm (9\"/>



ANCHOR POST DETAILS
For Connection Details D and E

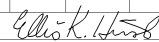
METAL BEAM GUARD RAILING CONNECTIONS TO BRIDGE SIDEWALKS AND CURBS


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NO SCALE

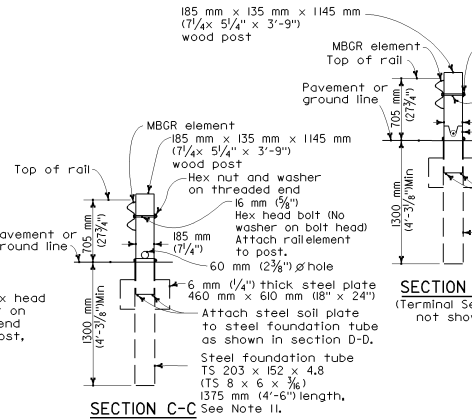
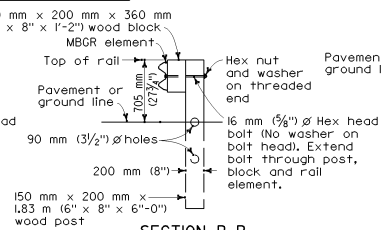
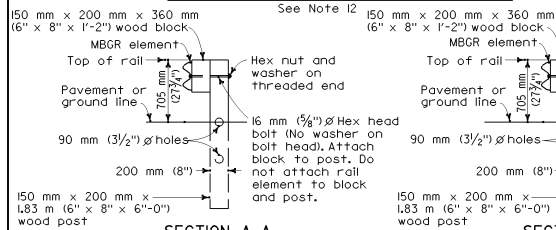
A77K

DIST	COUNTY	ROUTE	POST MILES	SHEET TOTAL
			TOTAL PROJECT	NO. SHEETS


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Post No.	System End Offset	System End Offset
1	915 mm (3'-0")	1070 mm (3'-6")
2	565 mm (1'-10 1/4")	705 mm (2'-3 3/4")
3	300 mm (12 1/4")	420 mm (1'-4 1/2")
4	170 mm (6 3/4")	270 mm (10 3/4")
5	75 mm (3")	150 mm (6")
6	20 mm (3/4")	70 mm (2 3/4")
7	0 mm (0")	20 mm (3/4")
8	0 mm (0")	0 mm (0")
9	0 mm (0")	0 mm (0")



SECTION D-D
(Terminal Section
not shown)

NOTES

- For additional details of Terminal System (Type SRT), refer to the manufacturer's installation instructions.
- The post offset dimensions are given to the center of the traffic face of the block, except at the first two posts, where the dimension is to the center of the traffic face of the post. Offset points are to be located by chord measurements at the back of the rail equal to the nominal post spacings shown. Posts are to be set approximately radial to the railing at each post location.
- Do not attach rail elements to posts 7 and 8.
- Attach strut to Post Nos. 1 and 2 foundation tubes with 16 mm (5/8") hex head bolts, washers and hex nuts. Bolts extend through the strut, steel foundation tube, and wood posts.
- For the length and type of guard railing or barrier the terminal system is attached to, see the Project Plans. For minimum length of guard railing used with terminal system and treatments, see Standard Plans A77D and A77E.
- Attach rail element to this post and block. Payment for this post, block and hardware is included in payment for the type of railing or barrier the terminal system is attached to, not part of payment for Terminal System (Type SRT).
- The deflector angle of the slot guard is to be positioned immediately downstream of the slots.
- For bearing plate orientation, refer to the manufacturer's installation instructions.
- Terminal system (Type SRT) is a flared end treatment for guard railing or single faced barrier railing. See Type IA and IB Layouts on Standard Plan A77D and Type BA Layout on Standard Plan A77E for typical use of this terminal system with guard railing. See Standard Plan A78E for typical use of this terminal system with single thrie beam barrier.
- A complete wrap around terminal section may be continued to be used in existing installations. New installations shall be constructed with the 3/4" wrap terminal section shown.
- A 1830 mm (6'-0") length steel foundation tube, TS 203 x 152 x 4.8 (TS 8 x 6 x 3/8"), without a soil plate, may be furnished and installed in the 1375 mm (4'-6") length steel foundation tube and soil plate shown. Minimum embedment of the 1830 mm (6'-0") length tube shall be 1760 mm (5'-9"). A 16 mm (5/8") hex head bolt and nut shall be installed in the hole in 1830 mm (6'-0") length tube to keep the wood post from dropping into the tube.
- Where site conditions will not accommodate use of the standard 1220 mm (4'-0") system end offset, 1070 mm (3'-6") or 915 mm (3'-0") system end offsets, as applicable, may be used. See Table A for post offset dimensions for 1070 mm (3'-6") and 915 mm (3'-0") system end offsets.

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METAL BEAM GUARD RAILING AND SINGLE FACED BARRIER RAILING TERMINAL SYSTEM END TREATMENT

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NO SCALE

A77L

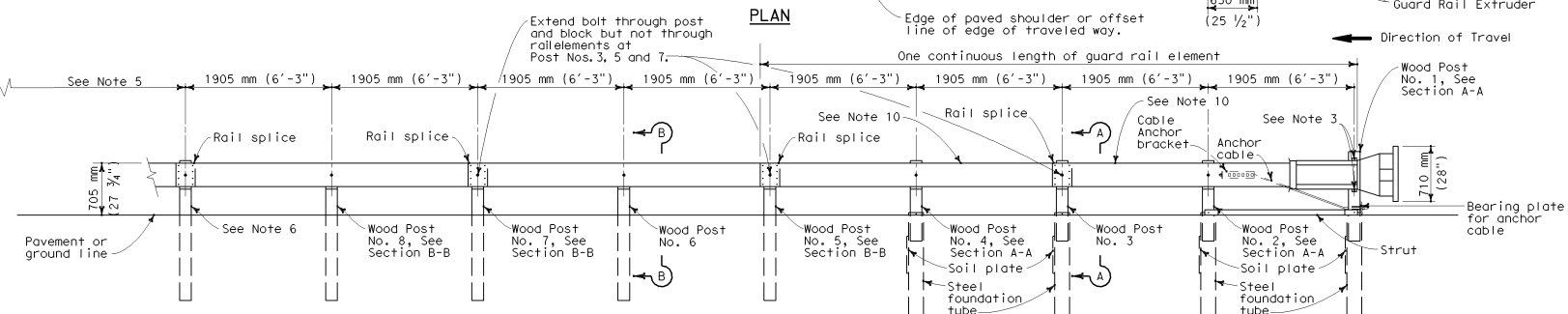
THIS STANDARD PLAN A77L INCLUDES CHANGES THAT WERE INCORPORATED IN REVISED STANDARD PLAN RSP A77L, DATED OCTOBER 26, 2000, AND ISSUED AS A PART OF ERRATUM NO. 99-1 FOR THE 1999 METRIC STANDARD PLANS.

NOTES

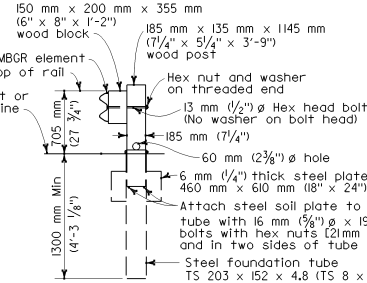
- For additional details of Terminal System (Type ET), refer to the manufacturer's installation instructions.
- Terminal System (Type ET) must be constructed so that the full length of the terminal system guard railing is in straight alignment. The Guard Rail Extruder head of the terminal system shall not encroach upon the adjacent paved shoulder or lane. A traffic approach flare of 50d for the full length of Terminal System (Type ET) installation shall be used where the Guard Rail Extruder head would encroach upon the adjacent paved shoulder or lane.
- Slide Guard Rail Extruder over the end of the rail element and attach to Post No.1 with lag screws. Do not bolt rail element to post. Guard Rail Extruder attachment brackets have 3 holes in each bracket to provide tolerance adjustment. Use the holes in the bracket closest to center of Post No.1. Drill 6 mm (1/4") pilot holes to accommodate lag screws.
- Attach strut to Post Nos.1 and 2 foundation tubes with hex head bolts, washers and hex nuts. Bolts extend through the strut, steel foundation tube, and wood posts. Channel side of strut to face downward.
- For length and type of guard railing or barrier the terminal system is attached to, see Project Plans. For minimum length of guard railing used with terminal system end treatments, see Standard Plans A770 and A77E.
- Attach rail element to this post and block. Payment for this post, block and hardware included in payment for the type of railing or barrier the terminal system is attached to, not part of the payment for Terminal System (Type ET).
- Yellow retroreflective sheeting, as provided by Terminal System (Type ET) manufacturer, shall be adhered to the face of extruder head. The sheeting shall be consistent with the design pattern and colors of a Type P object marker panel.
- Attach rail to Post No.2 (no wood block) in same manner shown in section A-A. Do not bolt rail to Post No.1. See Note 3.
- Terminal System (Type ET) is an in-line end treatment for guard railing or single faced barrier railing where site conditions will not accommodate use of a flared end treatment. Do not use Terminal System (Type ET) where extrusion of the rail on the back side of the installation would be in the path of pedestrian or vehicular traffic.
- A continuous rail element section between Post Nos.1 and 5 (no intermediate rail splices) may continue to be used in existing installations. New installations shall be constructed as shown.
- A 1830 mm (6'-0") length steel foundation tube, TS 203 x 152 x 4.8 (TS 8 x 6 x 3/8"), without a soil plate, may be furnished and installed in place of the 1375 mm (4'-6") length steel foundation tube and soil plate shown. Minimum embedment of the 1830 mm (6'-0") length tube shall be 1760 mm (5'-9"). A 16 mm (5/8") hex head bolt and nuts shall be installed in the hole in the 1830 mm (6'-0") length tube to keep the wood post from dropping into the tube.

Limits of guard railing or barrier railing See Note 5

Pay Limits for Terminal System (Type ET)

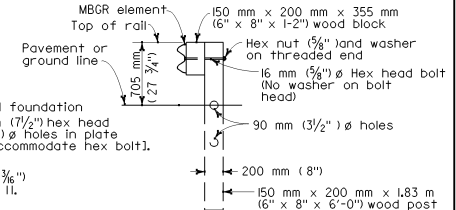


ELEVATION
TERMINAL SYSTEM (TYPE ET)
See Notes 9 and 10



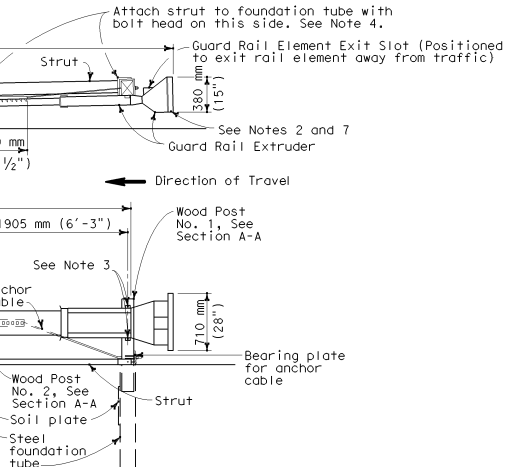
SECTION A-A

Soil plate and wood post attachment to steel foundation tube similar for Post Nos.1, 2 and 4. Wood blocks not used with Post Nos.1 and 2. See Note 8.



SECTION B-B

Post Nos. 5, 7 and 8 similar except rail elements are not attached to Post Nos.5 and 7



METAL BEAM GUARD RAILING AND SINGLE FACED BARRIER RAILING TERMINAL SYSTEM END TREATMENT

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NO SCALE

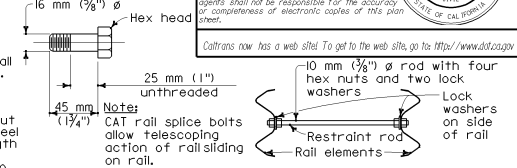
A77M

NOTES:

- For additional details of Terminal System (Type CAT), refer to the manufacturer's installation instructions.
- Terminal System (Type CAT) is to be used as an in-line end treatment for guard railing or single faced barrier railing where site conditions will not accommodate use of a flared end treatment. Terminal System (Type CAT) to be used only in locations where there will be traffic on one side of the terminal system. For those locations where traffic would be on both sides of the CAT system, see Standard Plan A82A.
- The Terminal System Backup is required for all Terminal System (Type CAT) installations. This allows the slotted rail elements to slide over the face of the unslotted rail elements.
- For length and type of railing or barrier the terminal system is attached to, see Project Plans. For minimum length of guard railing used with terminal system and treatments, see Standard Plans A77D and A77E.
- Both of the 3.43 mm (0.1345") thick slotted rail elements have an attachment plate welded to the back side of one end of each rail element. Attach the welded plate end of the rail elements to Post No. 4 prior to splicing the 2.67 mm (0.1046") thick slotted rail element over the 3.43 mm (0.1345") thick slotted rail element.
- The 2.67 mm (0.1046") thick slotted rail elements have four 19 mm (3/4") diameter holes near one end of the rail elements for the attachment of the spacer channel. Attach this end of the rail elements to Post No. 2.
- For details of the anchor plate and the 19 mm (3/4") cable attached to Post No. 6, see Standard Plans A77H.

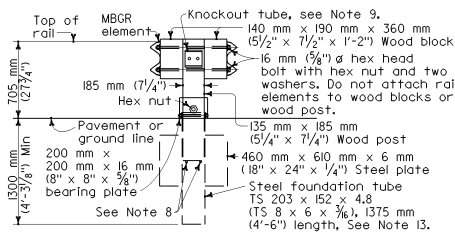
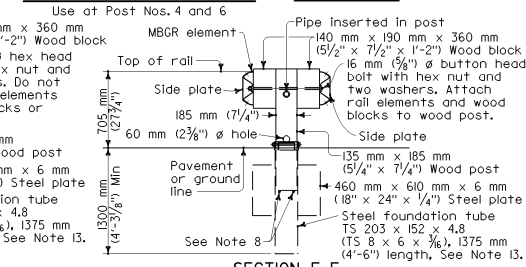
- Attach steel soil plate to steel foundation tube with 16 mm ϕ x 190 mm (5/8" x 7 1/2") hex head bolts with hex nuts [21 mm (5/8") ϕ holes in plate and in two sides of tube to accommodate hex bolts.
- The 150 mm x 200 mm (6" x 8") knockout tube is to be located 100 mm (4") down from top of wood post. Attach the knockout tube to the post with two 10 mm (3/8") ϕ lag screws and flat washers.
- Attach strut to Post Nos. 1 and 2 foundation tubes with 16 mm (5/8") ϕ hex head bolts, washers, and hex nuts. Bolts extend through the strut, steel foundation tube, and wood posts.
- Do not attach the rail elements to Post Nos. 3, 5 and 6.
- Yellow retroreflective sheeting, as provided by the Terminal System (Type CAT) manufacturer, shall be adhered to the rounded end of nose plate. The sheeting shall be consistent with the design pattern and colors of a Type P object marker panel. The sheeting shall be positioned on the end of nose plate so that it is visible to approaching traffic.
- A 1830 mm (6'-0") length steel foundation tube, TS 203 x 152 x 4.8 (8 x 6 x 3/8"), without a soil plate, may be furnished and installed in place of the 1375 mm (4'-6") length steel foundation tube and soil plate shown. Minimum embedment of the 1830 mm (6'-0") length tube shall be 1760 mm (5'-9"). A 16 mm (5/8") ϕ hex head bolt and nut shall be installed in the hole in 1830 mm (6'-0") length tube to keep the wood post from dropping into the tube.

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
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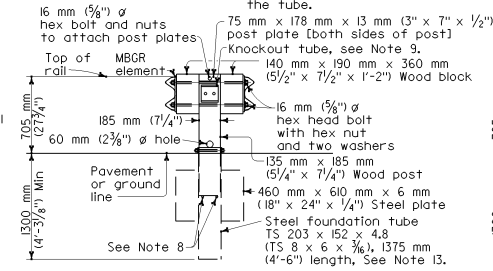


CAT RAIL SPICE BOLT

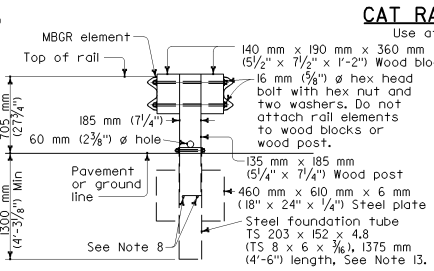
SECTION D-D



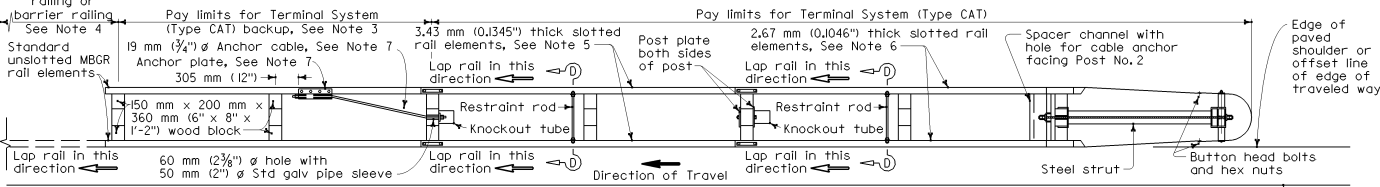
SECTION A-A



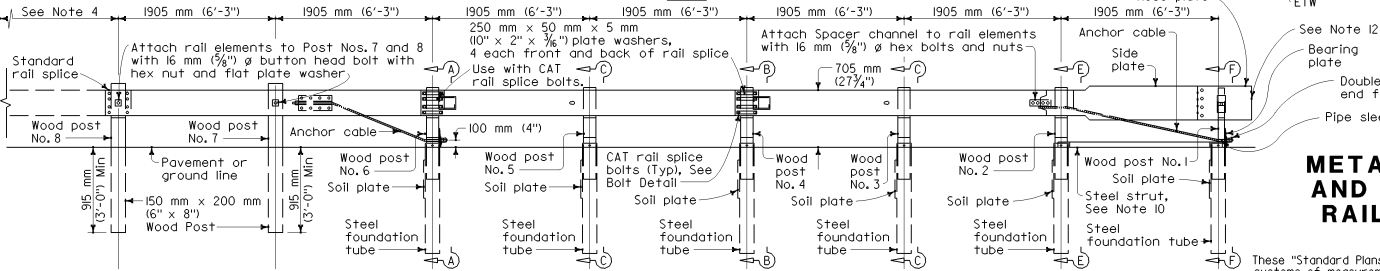
SECTION B-B



SECTION C-C



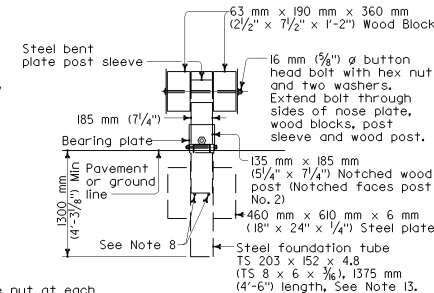
PLAN



ELEVATION

TERMINAL SYSTEM (TYPE CAT)

See Note 2



SECTION E-E

METAL BEAM GUARD RAILING AND SINGLE FACED BARRIER RAILING TERMINAL SYSTEM END TREATMENT

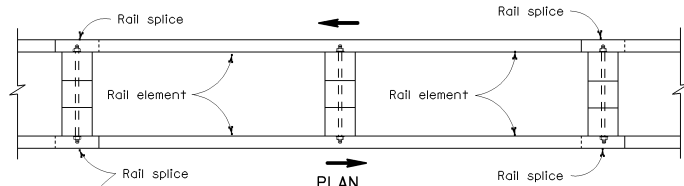
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NO SCALE

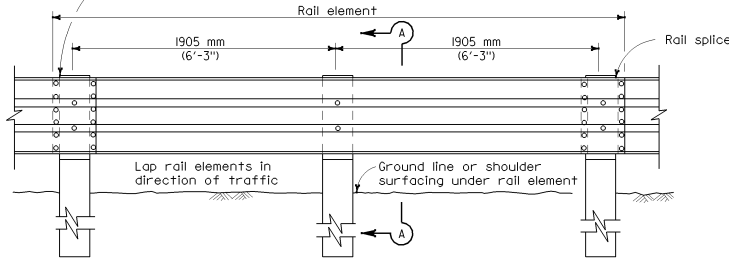
A77N

THIS STANDARD PLAN A77N INCLUDES CHANGES THAT WERE INCORPORATED IN REVISED STANDARD PLAN RSP A77N, DATED OCTOBER 26, 2000, AND ISSUED AS A PART OF ERRATUM NO. 99-1 FOR THE 1999 METRIC STANDARD PLANS.

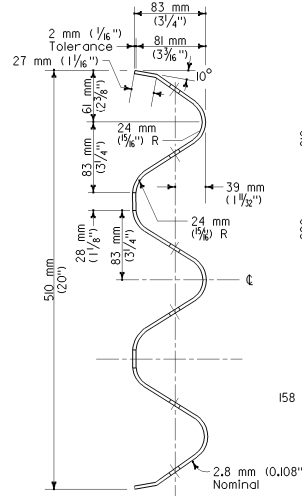
Return to Table of Contents



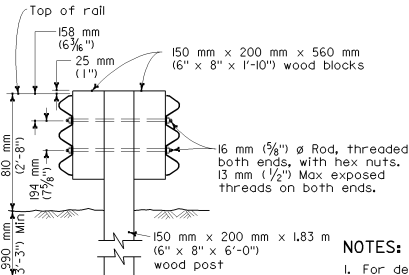
PLAN



ELEVATION

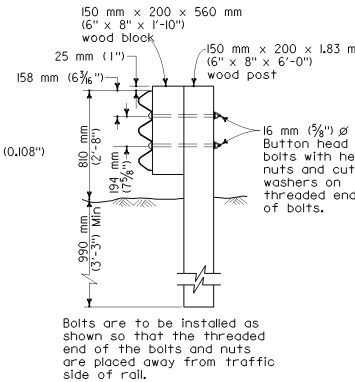
DOUBLE THRIE BEAM BARRIER(Wood post and blocks)
See Note 1SECTION THRU
RAIL ELEMENT**RAIL ELEMENT SPICE DETAIL**

See Note 11

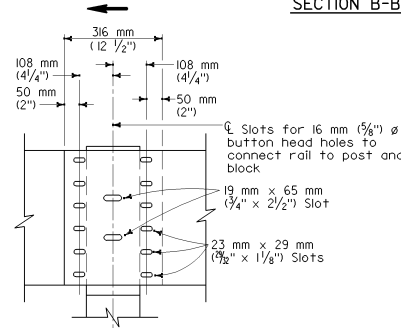


SECTION A-A

See Note 9



SECTION B-B



ELEVATION

RAIL ELEMENT SPICE DETAIL

See Note 11

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
Ellis K. Wirst REGISTERED CIVIL ENGINEER No. 417926 State of California July 1, 2002 PLANS APPROVAL DATE The State of California or its officers or agents shall not be responsible for the accuracy or completeness or electronic copies of this plan sheet. Caltrans now has a web site! To get to the web site, go to http://www.dot.ca.gov					

NOTES:

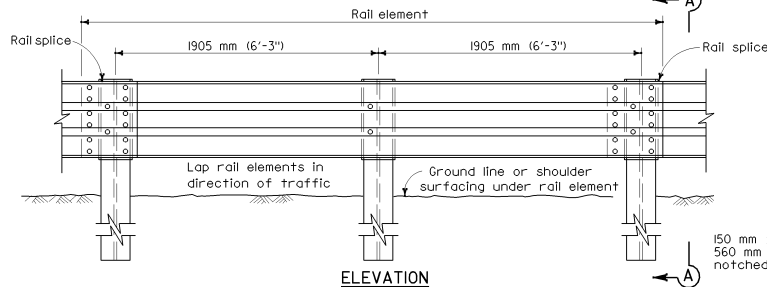
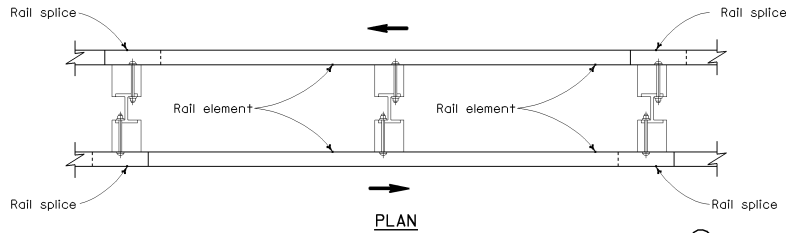
- For details of steel post with wood block thrie beam barrier, see Standard Plan A78B.
- For details of standard hardware, post and blocks used to construct thrie beam barrier, see Standard Plan A78C.
- Thrie beam barrier post spacing to be 1905 mm (6'-3") center to center, except as otherwise noted.
- Top of barrier rail to be 810 mm (32") above ground line or shoulder surfacing under the rail element.
- For barrier end treatments and barrier connections, see Standard Plans A78E, A78EA, A78F and A78G.
- For connection to Concrete Barrier (Type 60), see Standard Plan A78I.
- Where standard embedment of barrier post is restricted by underground concrete facilities such as footing of walls, columns, etc., use post footing details on Standard Plan A77F.
- For details of thrie beam barrier on bridge and thrie beam barrier at fixed object, see Standard Plan A78D.
- Where offset roadway grades are encountered and height of rail element for each roadway cannot be obtained as shown in Section A-A, use saw tooth installation as shown on Standard Plan A78B.
- Direction of traffic indicated by →.
- Connect the overlapped ends of the thrie beam rail elements with 16 mm (5/8") Ø x 35 mm (1 3/8") button head oval shoulder bolts inserted into the 23 mm x 29 mm (7/8" x 1 1/8") slots and bolted together with 16 mm (5/8") x 35 mm (1 3/8") recessed hex nuts. A total of 12 bolts and nuts are to be used at each rail splice connection. The ends of the rail elements are to be overlapped in the direction of traffic (see details). Where a terminal section is to be attached to the end of a rail element, a total of 4 of the above described splice bolts and nuts are to be used. Where a return section is to be attached to the ends of the rail elements, a total of 8 of the above described splice bolts and nuts are to be used.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION**THRIE BEAM BARRIER
TYPICAL WOOD POST
WITH WOOD BLOCK**

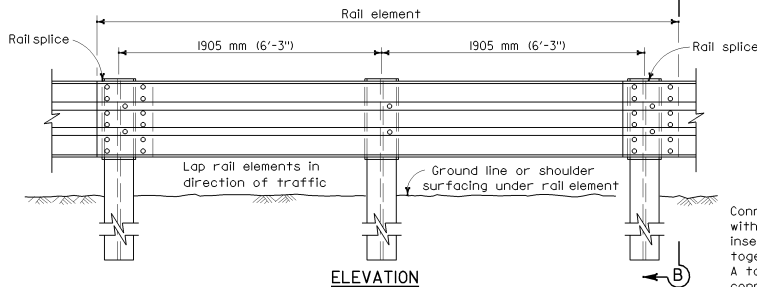
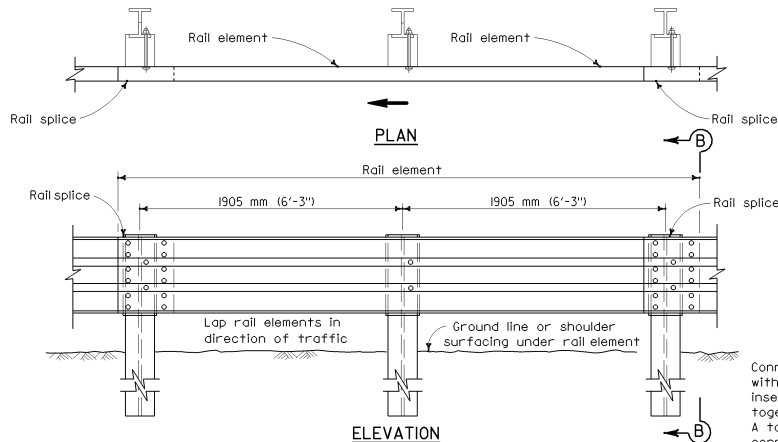
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NO SCALE

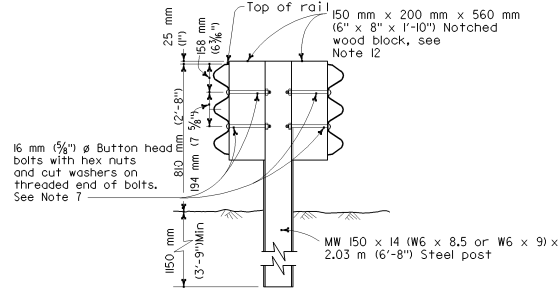
A78A



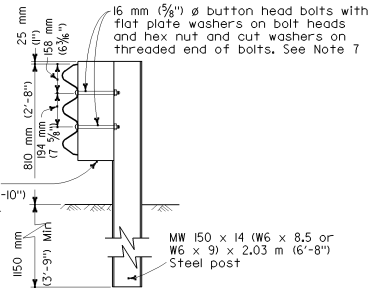
DOUBLE THRIE BEAM BARRIER
(Steel post and wood block)
See Note 1



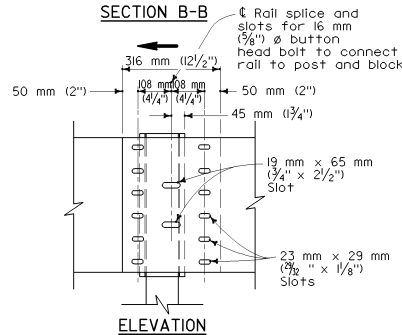
SINGLE THRIE BEAM BARRIER
(Steel post and wood block)
See Note 1



SECTION A-A



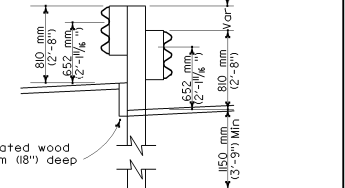
SECTION B-B



RAIL ELEMENT SPICE DETAIL

Connect the overlapped ends of the thrie beam rail elements with 16 mm (5/8") Ø x 35 mm (1 1/8") button head oval shoulder bolts inserted into the 23 mm x 29 mm (7/8" x 1 1/8") slots and bolted together with 16 mm (5/8") Ø x 35 mm (1 1/8") recessed hex nuts. A total of 12 bolts and nuts are to be used at each rail splice connection. The ends of the rail elements are to be overlapped in the direction of traffic (see details). Where a terminal section is to be attached to the end of a rail element, a total of 4 of the above described splice bolts and nuts are to be used. Where a return section is to be attached to the end of rail elements, a total of 8 of the above described splice bolts and nuts are to be used.

DIST.	COUNTY	ROUTE	KILOMETER POST	SHEET	TOTAL
				NO.	SHEETS
<p><i>Ellis K. Hirst</i> REGISTERED CIVIL ENGINEER</p> <p>July 1, 2002 PLANS APPROVAL DATE</p> <p>The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.</p> <p>Caltrans now has a web site! To get to the web site, go to http://www.dot.ca.gov</p>					
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**DOUBLE THRIE BEAM BARRIER
SAW TOOTH INSTALLATION**
(Steel post and wood blocks only)
See Note 10

NOTES:

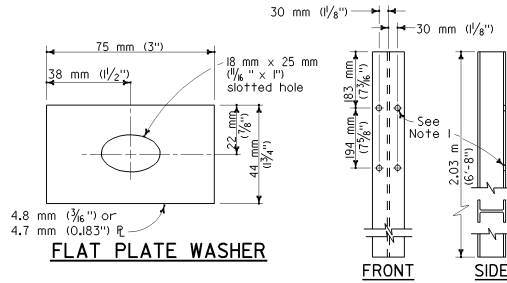
- For details of the cross section of the thrie beam rail element and details for wood post with wood block installations, see Standard Plan A78A.
- For details of standard hardware, posts and blocks used to construct thrie beam barrier, see Standard Plan A78C.
- Thrie beam barrier post spacing to be 1905 mm (6'-3") center to center, except as otherwise noted.
- Top of barrier rail to be 810 mm (32") above ground line or shoulder surfacing under the rail element.
- For barrier end treatments and barrier connections, see Standard Plans A78E, A78EA, A78F and A78G.
- For connection to Concrete Barrier (Type 60), see Standard Plan A78I.
- Attach rail element to wood block and steel post with 2 bolts on approaching traffic side of block and post web.
- Where standard embedment of barrier post is restricted by underground concrete facilities such as footing of walls, columns, etc., use post footing details on Standard Plan A77F.
- For details of thrie beam barrier on bridge and thrie beam barrier at fixed object, see Standard Plan A78D.
- Saw tooth installation to be used where offset roadway grades are encountered and height of rail element for each roadway cannot be obtained as shown in Section A-A.
- Direction of traffic indicated by →
- Notched face of wood block faces steel post.

STATE OF CALIFORNIA
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**THRIE BEAM BARRIER
TYPICAL STEEL POST
WITH WOOD BLOCK**

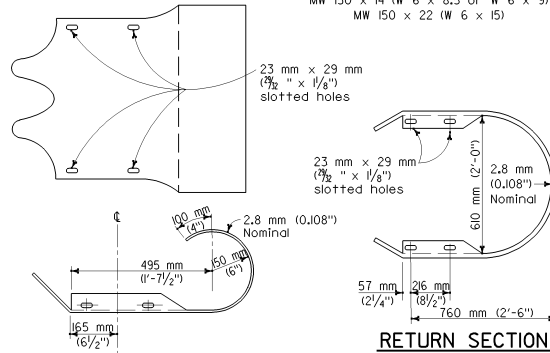
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NO SCALE

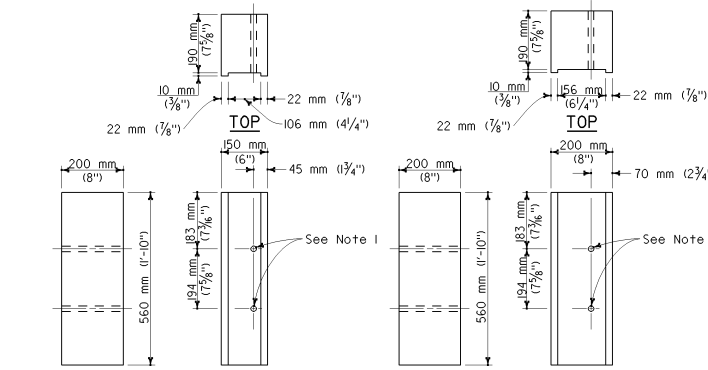
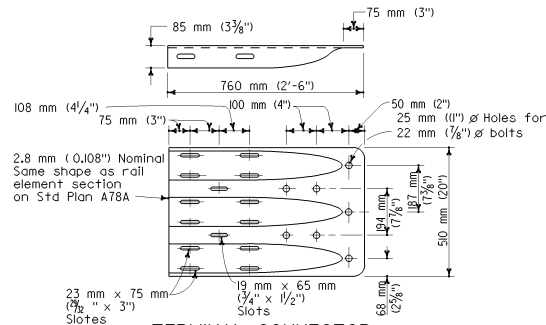
A78B



STEEL POST
 MW 150 x 14 (W 6 x 8.5 or W 6 x 9)
 MW 150 x 22 (W 6 x 15)

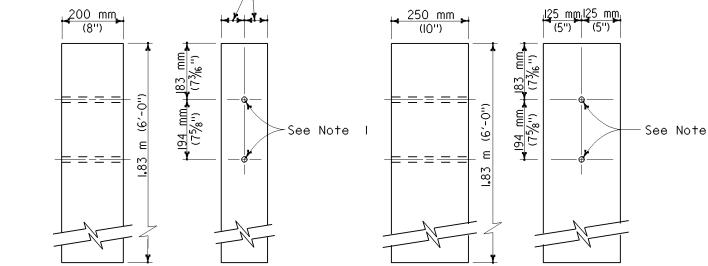


TERMINAL SECTION
 See Note 2



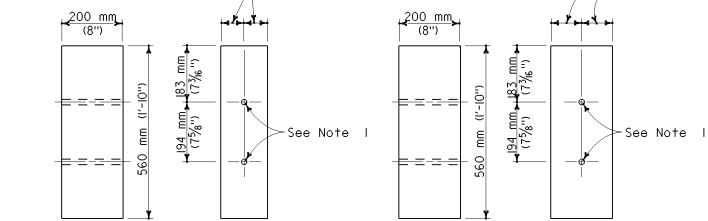
150 mm x 200 mm (6" x 8")
 See Notes 4 and 6

200 mm x 200 mm (8" x 8")
 See Notes 5 and 6



150 mm x 200 mm (6" x 8")
 See Note 1

250 mm x 250 mm (10" x 10")
 See Note 1



150 mm x 200 mm (6" x 8")
 See Note 1

200 mm x 200 mm (8" x 8")
 See Note 1

DIST.	COUNTY	ROUTE	KILOMETER POST	SHEET	TOTAL
				NO.	SHEETS

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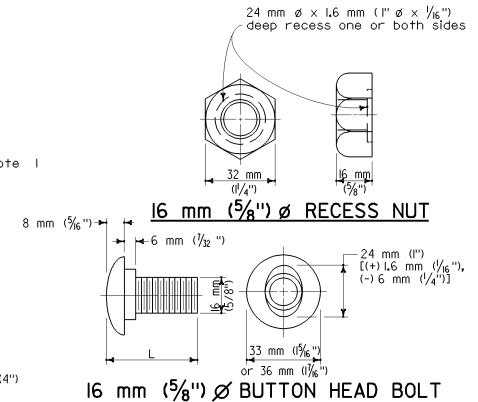
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NOTES:

- All holes in steel post to be 21mm (3/4") dia maximum. Holes in wood posts and wood blocks to be 20 mm ϕ \pm 1.6 mm (3/4" ϕ \pm 1/16").
- Terminal sections not to be installed on the trailing end of single three beam barrier constructed adjacent to one-way roadways.
- Dimensions shown for wood post are nominal.
- For use with MW 150 x 14 (W 6 x 8.5 or W 6 x 9) steel post.
- For use with MW 150 x 22 (W 6 x 15) steel post.
- Notched face of wood block faces steel post.
- Direction of traffic Indicated by \rightarrow



L	THREAD LENGTH
35 mm (1 1/4")	full thread length
50 mm (2")	full thread length
255 mm (9 1/2")	100 mm (4") Min thread length
460 mm (18")	100 mm (4") Min thread length

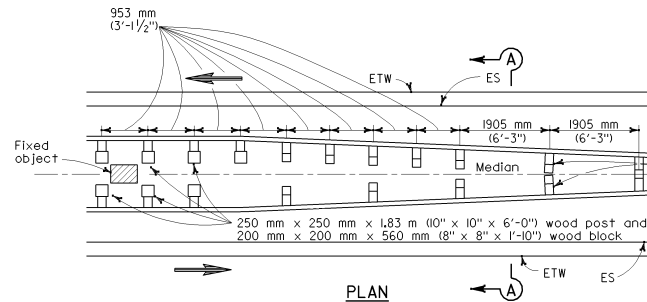
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 DEPARTMENT OF TRANSPORTATION

**THREE BEAM BARRIER
 POSTS, BLOCKS AND
 STANDARD HARDWARE DETAILS**

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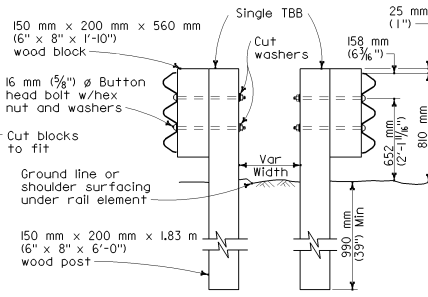
NO SCALE

A78C



THRIE BEAM BARRIER AT FIXED OBJECTS

(Wood post and block shown)
For a series of fixed objects (bridges, columns, overhead signs support, etc.) additional 250 mm x 250 mm x 1.83 m (10\"/>



SECTION A-A
Wood post with wood block shown
See Note 3

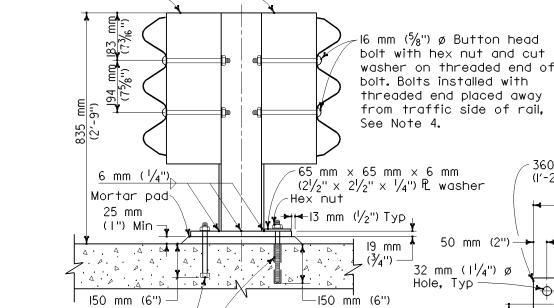
THRIE BEAM BARRIER DELINEATION

See Note 5

NOTES

- For a typical steel post and wood block thrie beam barrier installation, use MW 150 x 22 x 2.03 m (W 6 x 15 x 6'-8\") steel post with 200 mm x 200 mm (8\"/>

200 mm x 200 mm x 560 mm
(8\"/>

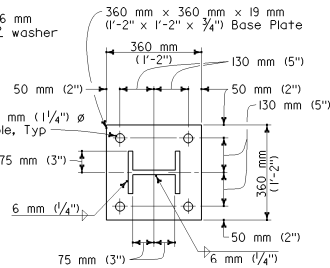


Cast-in-place Option

22 mm ϕ x 220 mm
(7/8\"/>

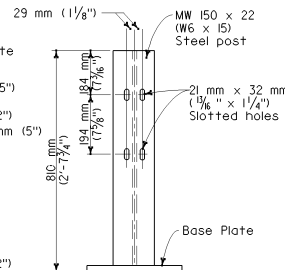
Drill and Grout Option

22 mm ϕ x 240 mm
(7/8\"/>



BRIDGE POST

BASE PLATE PLAN



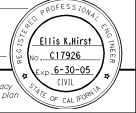
BRIDGE

POST DETAILS

ELEVATION

DOUBLE THRIE BEAM BARRIER ON BRIDGE

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	POST NO.	SHEET TOTAL SHEETS
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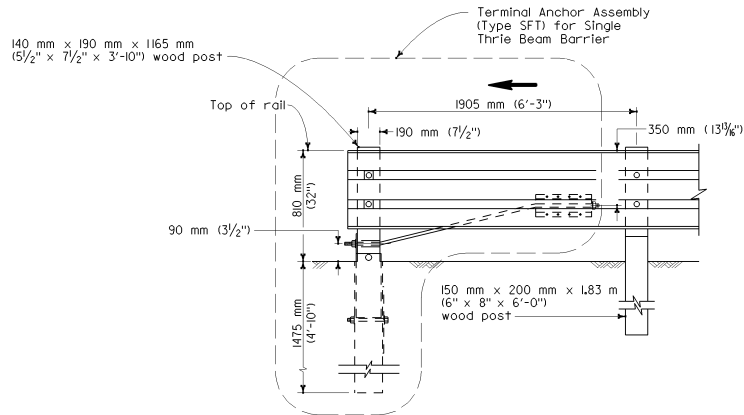


THRIE BEAM BARRIER MISCELLANEOUS DETAILS

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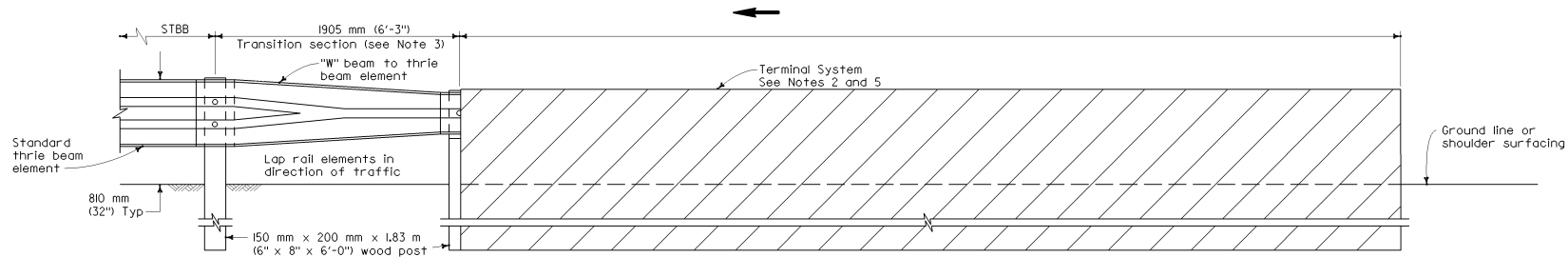
NO SCALE

A78D



**END TREATMENT FOR TRAFFIC DEPARTURE END
OF SINGLE THRIE BEAM BARRIER**

(For one-way roadways)
See Note 1



**END TREATMENT FOR TRAFFIC APPROACH END
OF SINGLE THRIE BEAM BARRIER**

DIST.	COUNTY	ROUTE	POST MILES	SHEET TOTAL
			TOTAL PROJECT	NO. SHEETS

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 STATE OF CALIFORNIA

NOTES


- For additional details of Terminal Anchor Assembly (Type SFT), see Standard Plans A77G and A77H.
- For type of terminal system to be used, see Project Plans and Special Provisions.
- The "W" beam to thrie beam section is required when the terminal system connection to the thrie beam barrier is a "W" beam rail.
- For details of connection of thrie beam barrier to bridge, retaining walls and abutments, see Standard Plans A78F and A78G.
- For details of a terminal system typically used as a flared end treatment, see Standard Plan A77L. For details of a terminal system typically used where site conditions will not accommodate a flared end treatment, see Standard Plans A77M and A77N.
- Direction of traffic Indicated by → .

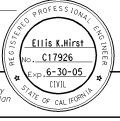
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DEPARTMENT OF TRANSPORTATION
**SINGLE THRIE BEAM BARRIER
END TREATMENTS**

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NO SCALE

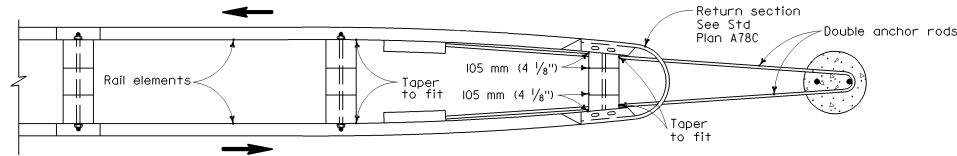
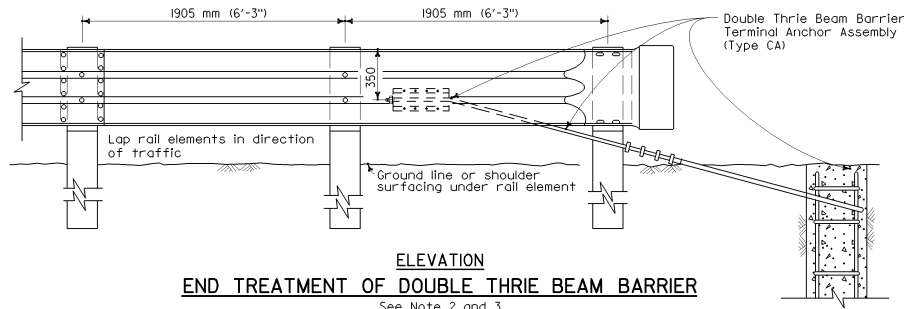
A78E

DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
 REGISTERED CIVIL ENGINEER					
July 1, 2002 PLANS APPROVAL DATE					
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NOTES

1. For anchor details, see Standard Plan A771.
2. For details of connection of thrie beam barrier to bridge railing, retaining walls and abutments, see Standard Plans A78F and A78G.
3. A crash cushion is required for the end of double thrie beam barrier where a Terminal Anchor Assembly (Type CA) is used, and when the end of the barrier is within 9.0 m (30') of the edge of the traveled way of approaching traffic. Where a crash cushion is required and the crash cushion attaches to end of the barrier, the terminal anchor assembly shown and the return section may not be required (see Project Plans).
4. Direction of traffic indicated by →.

**PLAN****ELEVATION****END TREATMENT OF DOUBLE THRIE BEAM BARRIER**

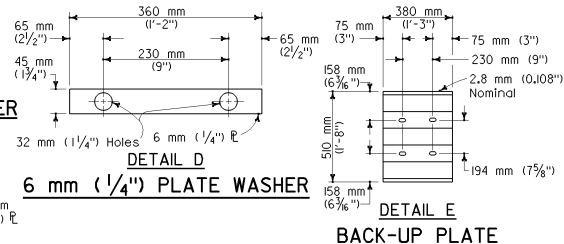
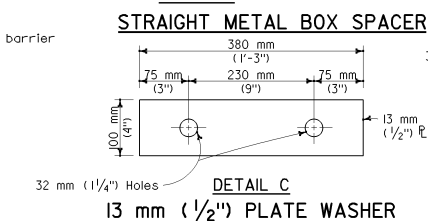
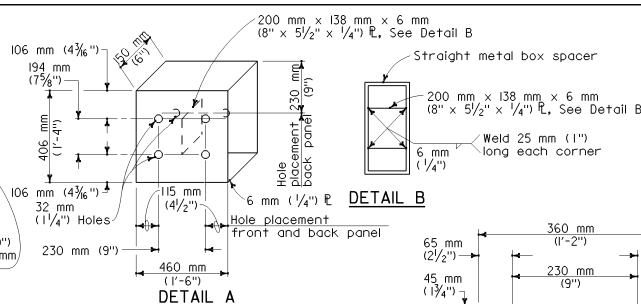
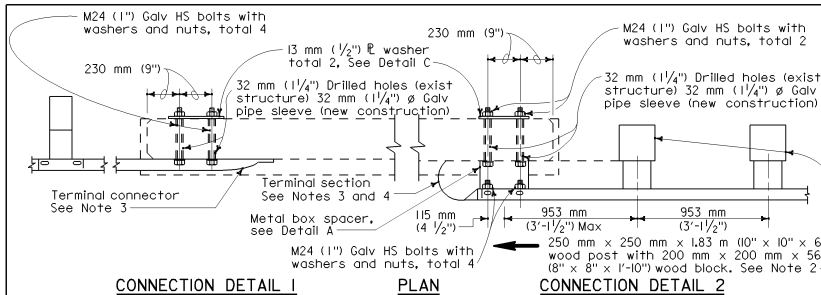
See Note 2 and 3

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**DOUBLE THRIE BEAM BARRIER
END TREATMENT**

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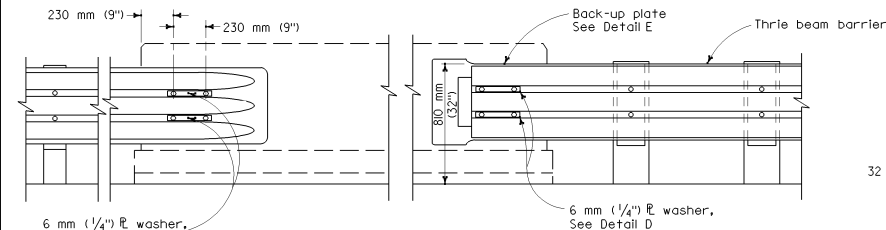
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A78EA

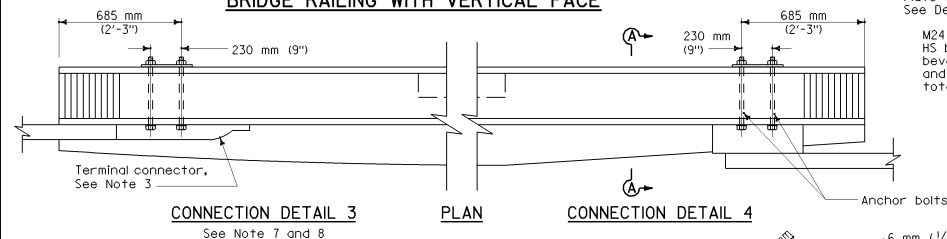


NOTES:

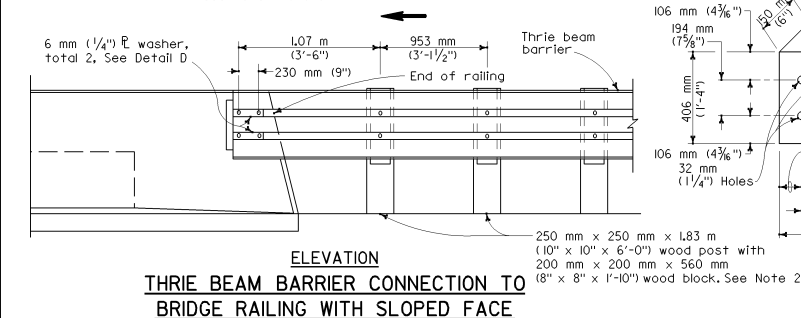
- These connection details apply to concrete bridge railing. For additional connection details see project plans.
- For additional details of the thrie beam barrier transition to bridge railing, see "Approach Barrier Transition Details" on Standard Plan A78G.
- Terminal sections and terminal connectors are to be fabricated to fit required spacing as shown.
- Terminal section not to be installed on trailing end of approach thrie beam barrier constructed adjacent to one-way roadway. When terminal section is required, trim section to fit.
- This dimension may vary slightly to fit existing bolt holes in existing bridge railing.
- Connection Details 1 and 3 are to be used on traffic departure end of bridge.
- Details for Connection Detail 3 similar to Connection Detail 1 except for anchorage bolts offset dimensions from end of bridge railing.
- Connection Detail 1 and 3, as applicable to the bridge railing involved, shall be used for both the departure and approach end of the bridge where the bridge railing is 9 m (30') or less from opposing traffic. Where Connection Detail 1 or 3 is used on the approach end of the structure, the thrie beam barrier shall be transitioned to the bridge railing as shown in the "Approach Barrier Transition Details" on Standard Plan A78G.
- Direction of traffic indicated by →



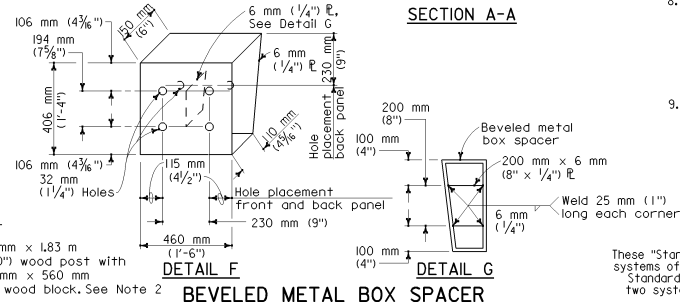
THRIE BEAM BARRIER CONNECTION TO BRIDGE RAILING WITH VERTICAL FACE



SECTION A-A



THRIE BEAM BARRIER CONNECTION TO BRIDGE RAILING WITH SLOPED FACE



THRIE BEAM BARRIER CONNECTIONS TO BRIDGE RAILING

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NO SCALE

A78F

DIST	COUNTY	ROUTE	POST MILES	SHEET TOTAL
			TOTAL PROJECT	NO. SHEETS

REGISTERED CIVIL ENGINEER

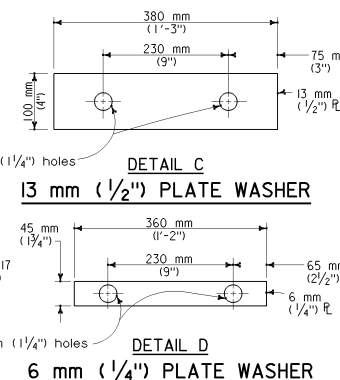
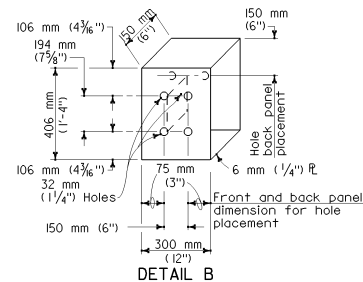
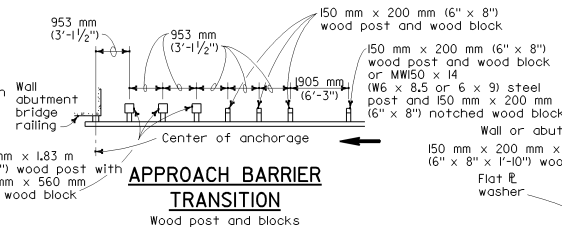
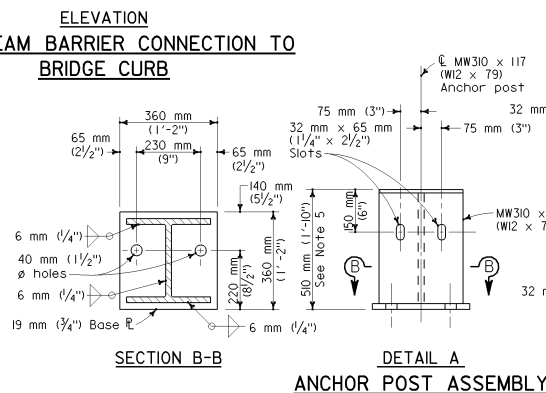
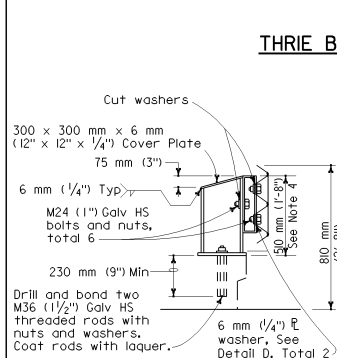
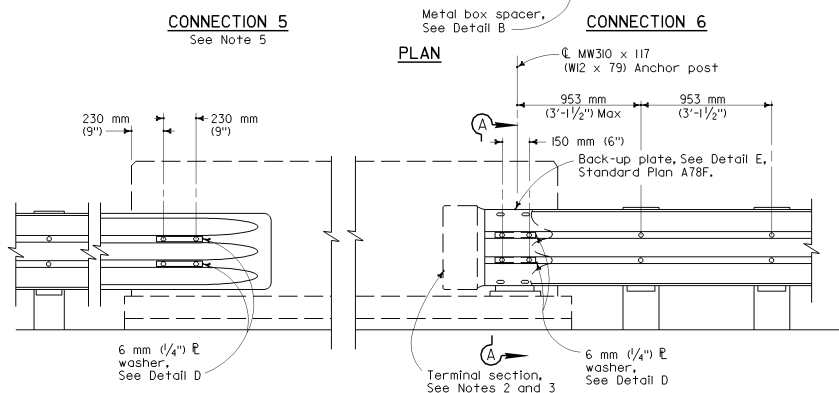
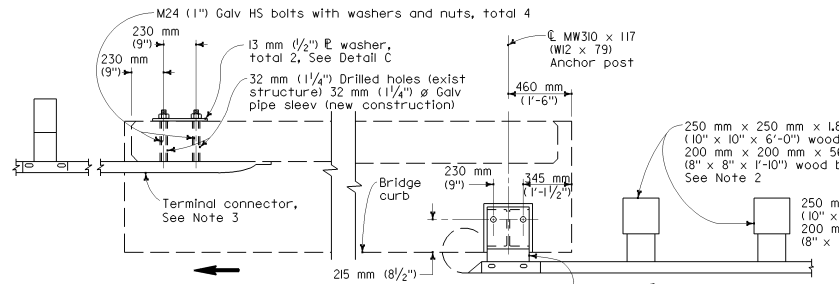
July 1, 2002

PLANS APPROVAL DATE

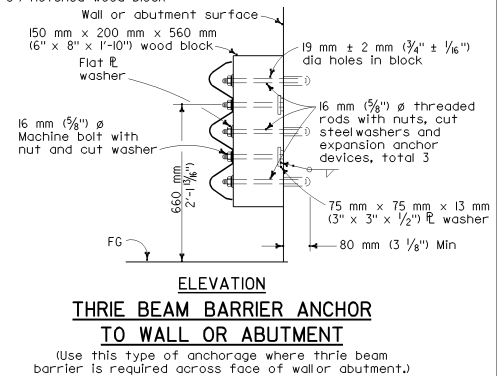
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DIST	COUNTY	ROUTE	POST MILES	SHEET TOTAL
TOTAL PROJECT			NO.	SHEETS
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NOTES

- These connection details apply to concrete bridge railing, abutments and retaining walls. For additional connection details see project plans.
- Terminal sections and terminal connectors are to be fabricated to fit required spacing as shown.
- Terminal section not to be installed on trailing end of approach thrie beam barrier constructed adjacent to one-way roadways. When terminal section is required, trim section to fit.
- Dependent dimensions shall be verified in the field before fabricating any end connections to conform with existing pavement elevation conditions. The height of the thrie beam barrier shown is to be maintained.
- Connection Detail 5 is to be used on traffic departure end of bridges with curbs.
- Do not attach barrier rail to bridge columns. Use separate post as shown on the detail for thrie beam barrier at wall or abutment on Standard Plan A78D.
- Direction of traffic indicated by
- Standard Plan A78H not included in this edition of the plans.

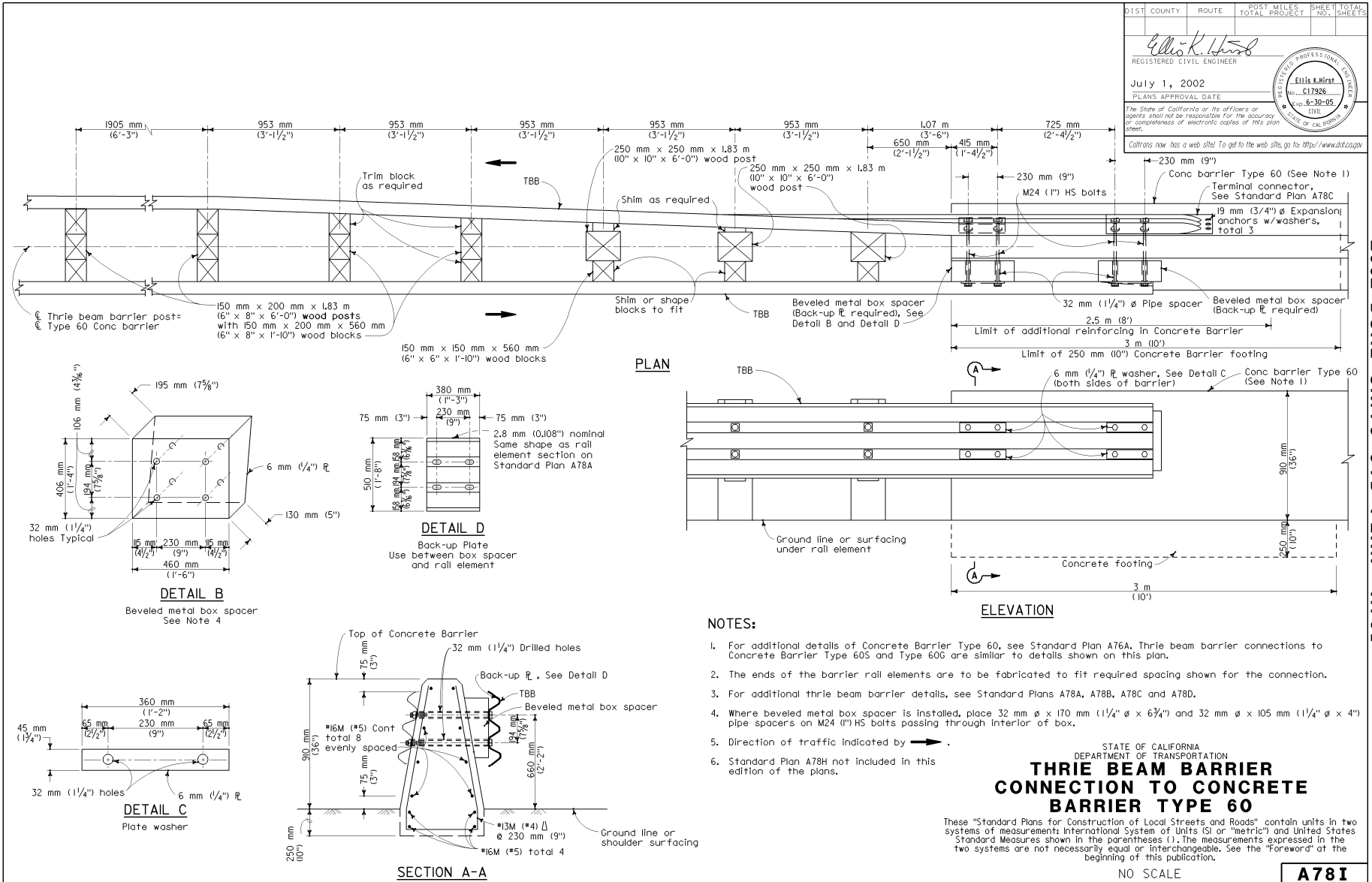
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THRIE BEAM BARRIER CONNECTIONS TO BRIDGE CURBS, RETAINING WALLS AND ABUTMENTS

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NO SCALE

A78G

**NOTES:**

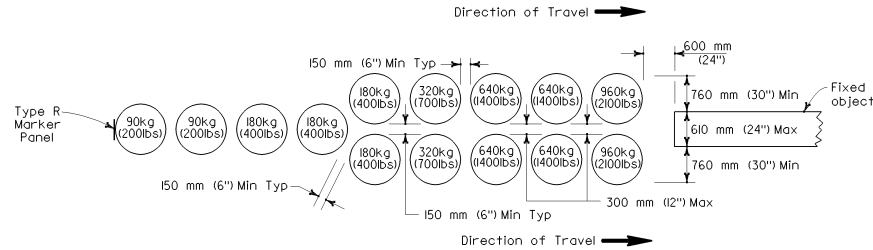
- For additional details of Concrete Barrier Type 60, see Standard Plan A76A. Thrie beam barrier connections to Concrete Barrier Type 60S and Type 60G are similar to details shown on this plan.
- The ends of the barrier rail elements are to be fabricated to fit required spacing shown for the connection.
- For additional thrie beam barrier details, see Standard Plans A78A, A78B, A78C and A78D.
- Where beveled metal box spacer is installed, place 32 mm ϕ x 170 mm ($1\frac{1}{4}$ " ϕ x $6\frac{3}{4}$ ") and 32 mm ϕ x 105 mm ($1\frac{1}{4}$ " ϕ x 4") pipe spacers on M24 (I") HS bolts passing through interior of box.
- Direction of traffic indicated by \rightarrow .
- Standard Plan A78H not included in this edition of the plans.

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**THRIE BEAM BARRIER
CONNECTION TO CONCRETE
BARRIER TYPE 60**

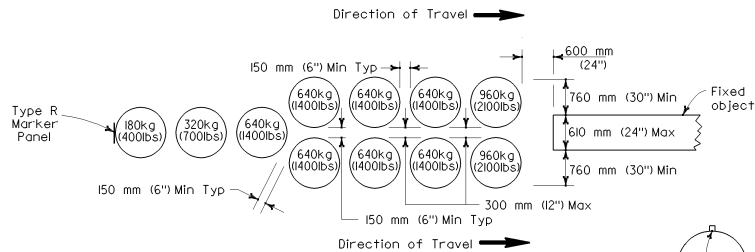
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NO SCALE

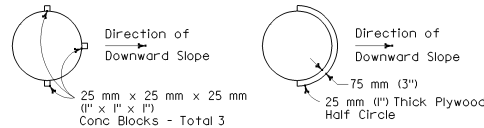
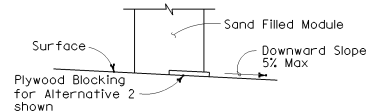
A78I

**ARRAY 'UI4'**

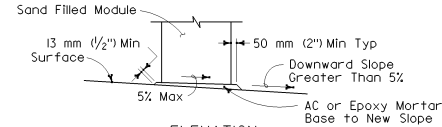
Approach speed 100 km/h (62 mph) or less

**ARRAY 'UII'**

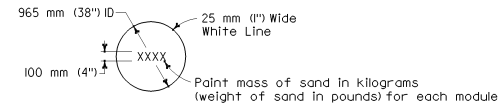
Approach speed 70 km/h (43 mph) or less

**ALTERNATIVE 1****PLAN****ALTERNATIVE 2****ELEVATION****BRIDGE DECK MODULE BLOCKING DETAILS**

(See Note 6)

**ELEVATION****SLOPED SEAT DETAIL**

(See Note 4)

**PAINTING DETAIL**

(See Note 5)

NOTES

- ① indicates module location and mass of sand in kilograms (weight of sand in pounds) for each module. Module spacing is based on the greater diameter of the modules.
- All sand masses (weights) are nominal.
- Each module is to contain amount of sand indicated, supported according to the manufacturer's instructions.
- Modules shall be placed on asphalt concrete, epoxy mortar or concrete surface. Modules to be placed on surfacing with greater than 5% downward slope shall be seated as shown.
- Mass of sand and outline of each module shall be painted on the surface at each module location.
- Module blocking, epoxied to the deck surface, is required for all modules placed on bridge decks. Two acceptable alternatives are shown. Other alternatives recommended by the manufacturer and approved by the Engineer will be accepted.
- Place the top of the Type R marker panel 25 mm (1") below the module lid.

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**CRASH CUSHION,
SAND FILLED
(UNIDIRECTIONAL)**

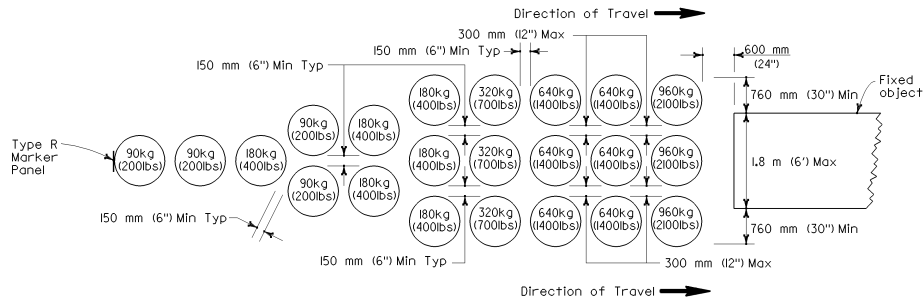
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NO SCALE

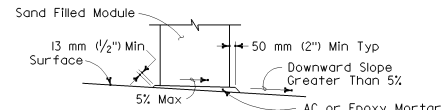
A81A

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
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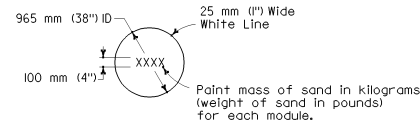
REGISTERED PROFESSIONAL ENGINEER
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 No. C17926
 Exp. 6-30-05
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 STATE OF CALIFORNIA

**ARRAY 'U22'**

Approach speed 100 km/h (62 mph) or less

**ELEVATION****SLOPED SEAT DETAIL**

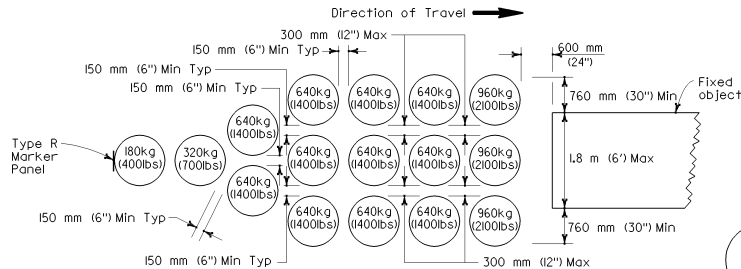
(See Note 4)

**PAINTING DETAIL**

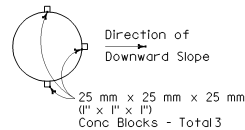
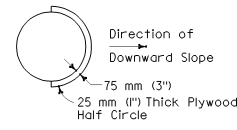
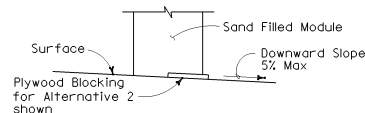
(See Note 5)

NOTES

1. (XXX) indicates module location and mass of sand in kilograms (weight of sand in pounds) modules. Module spacing is based on the greater diameter of the modules.
2. All sand masses (weights) are nominal.
3. Each module is to contain amount of sand indicated, supported according to the manufacturer's instructions.
4. Modules shall be placed on asphalt concrete, epoxy mortar or concrete surface. Modules to be placed on surfacing with greater than 5% downward slope shall be seated as shown.
5. Mass of sand and outline of each module shall be painted on the surface at each module location.
6. Module blocking, epoxied to the deck surface, is required for all modules placed on bridge decks. Two acceptable alternatives are shown. Other alternatives recommended by the manufacturer and approved by the Engineer will be accepted.
7. Place the top of the Type R marker panel 25 mm (1 inch) below the module lid.

**ARRAY 'U16'**

Approach speed 70 km/h (43 mph) or less

**ALTERNATIVE 1****ALTERNATIVE 2****PLAN****ELEVATION****BRIDGE DECK MODULE BLOCKING DETAILS**

(See Note 6)

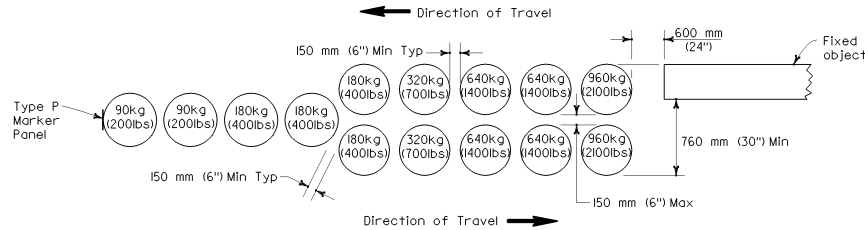
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**CRASH CUSHION,
SAND FILLED
(UNIDIRECTIONAL)**

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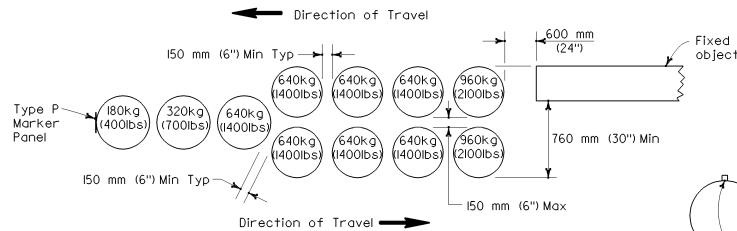
NO SCALE

A81B

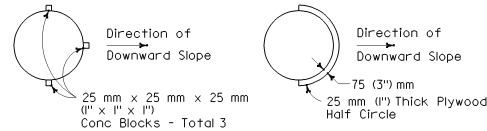
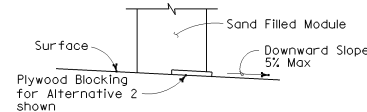
DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
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**ARRAY 'BI4'**

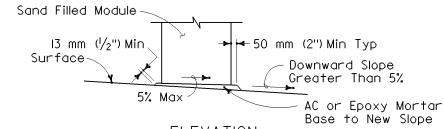
Approach speed 100 km/h (62 mph) or less

**ARRAY 'BI1'**

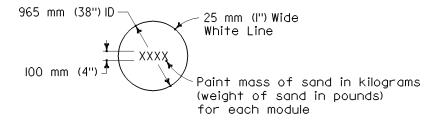
Approach speed 70 km/h (43 mph) or less

**ALTERNATIVE 1****PLAN****ALTERNATIVE 2****ELEVATION****BRIDGE DECK MODULE BLOCKING DETAILS**

(See Note 7)

**ELEVATION****SLOPED SEAT DETAIL**

(See Note 5)

**PAINTING DETAIL**

(See Note 6)

NOTES

1. (XXX) Indicates module location and mass of sand in kilograms (weight of sand in pounds) for each module. Module spacing is based on the greater diameter of the module.
2. All sand masses (weights) are nominal.
3. Each module is to contain amount of sand indicated, supported according to the manufacturer's instructions.
4. Bidirectional crash cushion arrays may be angled toward approaching traffic. Amount of angle not to exceed 10 degrees.
5. Modules shall be placed on asphalt concrete, epoxy mortar or concrete surface. Modules to be placed on surfacing with greater than 5% downward slope shall be seated as shown.
6. Mass of sand and outline of each module shall be painted on the surface at each module location.
7. Module blocking, epoxied to the deck surface, is required for all modules placed on bridge decks. Two acceptable alternatives are shown. Other alternatives recommended by the manufacturer and approved by the Engineer will be accepted.
8. Place the Type P marker panel so that the bottom of the panel is at the bottom of the module.

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**CRASH CUSHION,
SAND FILLED
(BIDIRECTIONAL)**

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NO SCALE

A81C

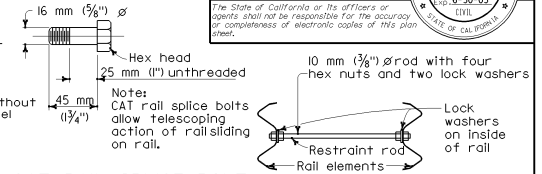
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REGISTERED CIVIL ENGINEER					
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 STATE OF CALIFORNIA

NOTES:

- For additional details of Crash Cushion (Type CAT), refer to the manufacturer's installation instructions.
- Crash Cushion (Type CAT) may be used at sites where the sides of the crash cushion would be exposed to opposing directions of travel (bidirectional traffic) or the same direction of travel (unidirectional traffic). For locations where traffic would only be on one side of the CAT system, use the Standard Plan A77N.
- The Crash Cushion Backup is required for all Crash Cushion (Type CAT) installations. This allows the slotted rail elements to slide over the face of the unslotted rail elements.
- For length and type of rolling or barrier the crash cushion is attached to, see Project Plans.
- Both of the 3.43 mm (0.1345") thick slotted rail elements have an attachment plate welded to the back side of one end of each rail element. Attach the welded plate end of the rail elements to Post No. 4 prior to splicing the 2.67 mm (0.1046") thick slotted rail element over the 3.43 mm (0.1345") thick slotted rail element.
- The 2.67 mm (0.1046") thick slotted rail elements have four 19 mm (3/4") diameter holes near one end of the rail elements for the attachment of the spacer channel. Attach this end of the rail elements to Post No. 2.
- Attach steel soil plate to steel foundation tube with 16 mm (5/8") ϕ x 190 mm (7 1/2") hex head bolts with hex nuts (21 mm (7/8") ϕ holes in plate and in two sides of tube to accommodate hex bolts).

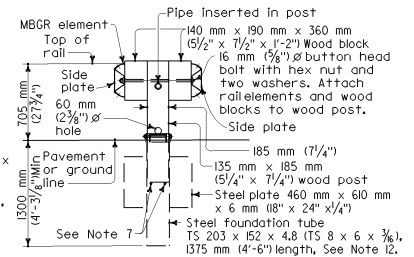
- The 150 mm x 200 mm (6" x 8") knockout tube is to be located 100 mm (4") down from top of wood post. Attach the knockout tube to the post with two 10 mm (3/8") lag screws and flat washers.
- Attach strut to Post Nos. 1 and 2 foundation tubes with 16 mm (5/8") ϕ hex head bolts, washers, and hex nuts. Bolts extend through the strut, steel foundation tube and wood posts.
- Do not attach the rail elements to Post Nos. 3, 5 and 6.
- Yellow retroreflective sheeting, as provided by the Crash Cushion (Type CAT) manufacturer, shall be adhered to the rounded end of nose plate. The sheeting shall be consistent with the design pattern and colors of a Type P object marker panel for unidirectional traffic and that of a Type R object marker panel for bidirectional traffic. The sheeting shall be positioned on the end of the nose plate so that it is visible to approaching traffic.
- A 1830 mm (6'-0") length steel foundation tube, TS 203 x 152 x 4.8 (TS 8 x 6 x 3/8"), without a soil plate, may be furnished and installed in place if the 1375 mm (4'-6") length steel foundation tube and soil plate shown. Minimum embedment of the 1830 mm (6'-0") length tube shall be 1750 mm (5'-9"). A 16 mm (5/8") ϕ hex head bolt and nut shall be installed in the hole in 1830 mm (6'-0") length tube to keep the wood post from dropping into the tube.
- 13 mm x 75 mm x 178 mm (1/2" x 3" x 7") post plate (both sides of post)



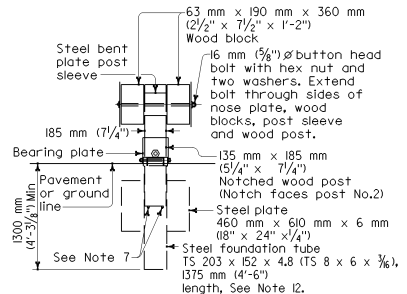
CAT RAIL SPLICE BOLT

Use at Post Nos. 4 and 6

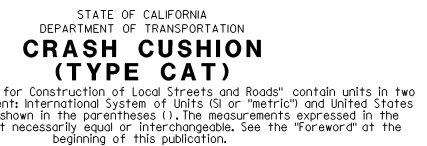
SECTION D-D



SECTION E-E



SECTION F-F



STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
CRASH CUSHION (TYPE CAT)

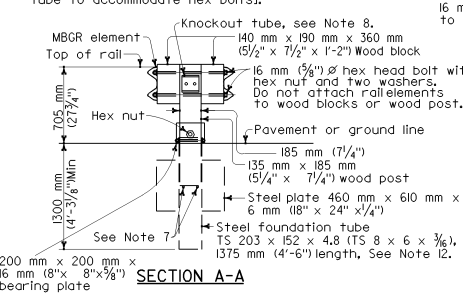
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NO SCALE

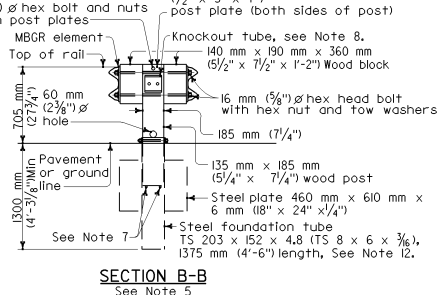
A82A

71

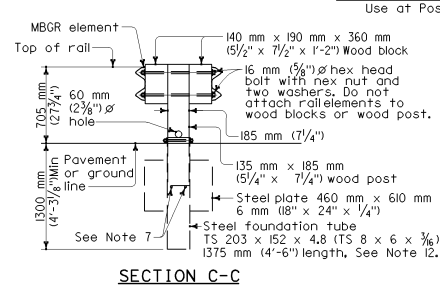
SECTION A-A



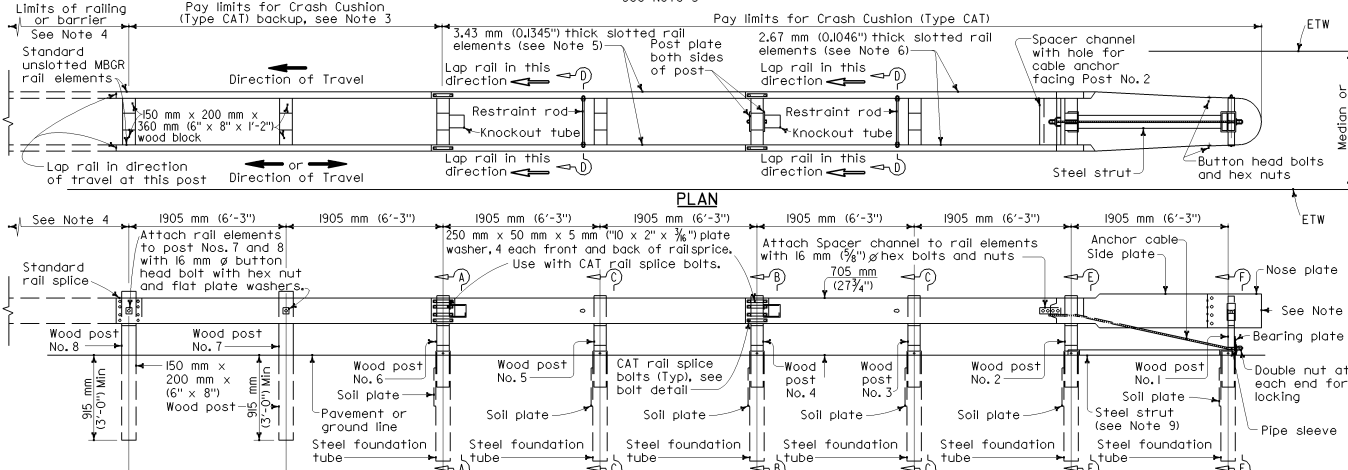
SECTION B-B



SECTION C-C



PLAN



ELEVATION

CRASH CUSHION (TYPE CAT)

See Note 2

1. For additional details of Crash Cushion (Type ADIEM), refer to the manufacturer's installation instructions.
2. Crash Cushion (Type ADIEM) may be used at sites where the sides of the crash cushion would be exposed to opposing directions of travel (bidirectional traffic) or the same direction of travel (unidirectional traffic).
3. The crash cushion concrete base shall be placed on a smooth surface (pavement or well compacted soil base) on the same horizontal plane as the barrier or railing it is to be attached to.
4. Installation of the crash cushion concrete base shall be accomplished by driving the anchor rods in well compacted soil base or soft asphalt concrete or by driving the anchor rods in drilled holes in hard asphalt concrete or portland cement concrete. See Table A for the location and lengths of anchor rod to be used.
5. Attach the crash cushion to the barrier or railing by bolting the splice angle plates to the crash cushion and the barrier or railing.
6. Lubricate the crash cushion base track and slide the modules along the track to the positions shown.
7. Yellow retroreflective sheeting, as provided by the crash cushion manufacturer, shall be adhered to the first module facing approaching traffic. This sheeting shall be consistent with the design pattern and colors of a Type P object marker panel for unidirectional traffic and that of the Type R object marker panel for bidirectional traffic.
8. For the length and type of barrier or railing the crash cushion is to be attached to, see the Project Plans.

DIST	COUNTY	ROUTE	KILOMETER TOTAL	POST PROJECT	SHEET NO.	TOTAL SHEET

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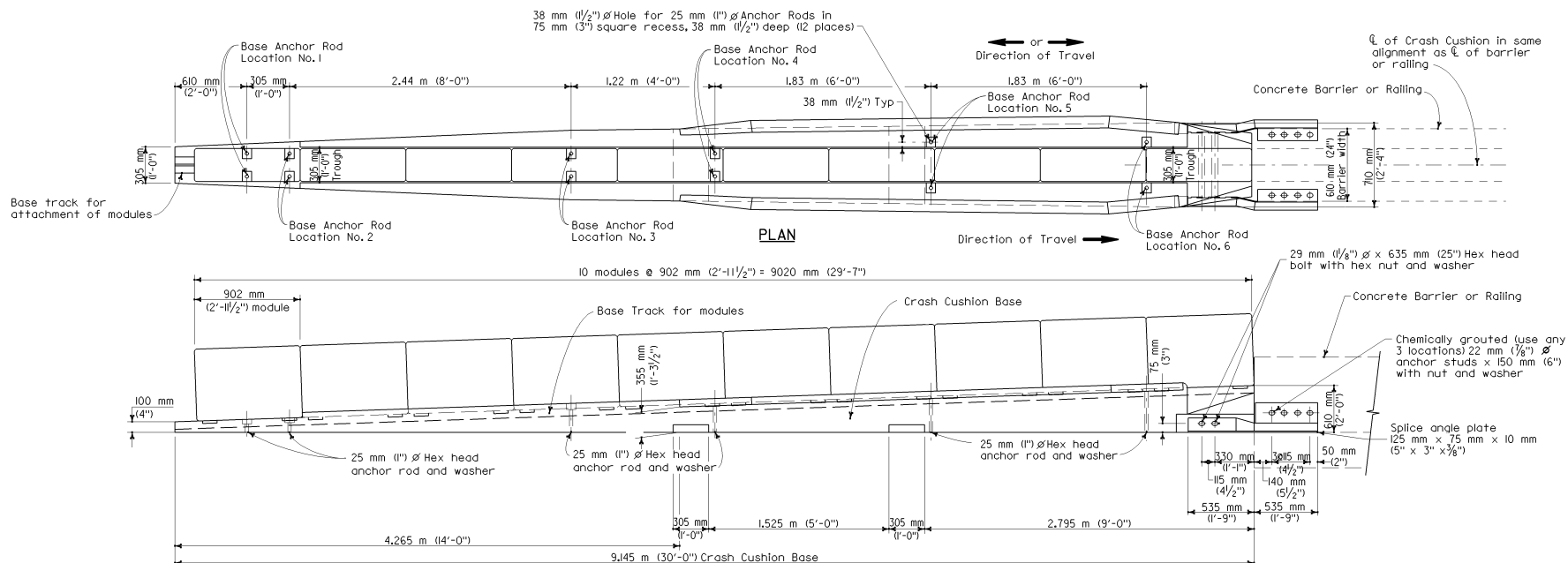
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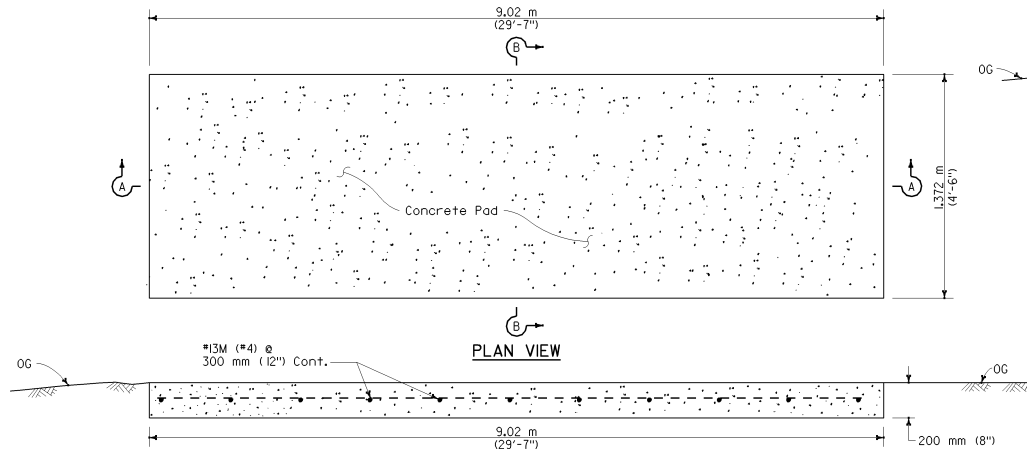


ELEVATION
CRASH CUSHION (TYPE ADIEM)

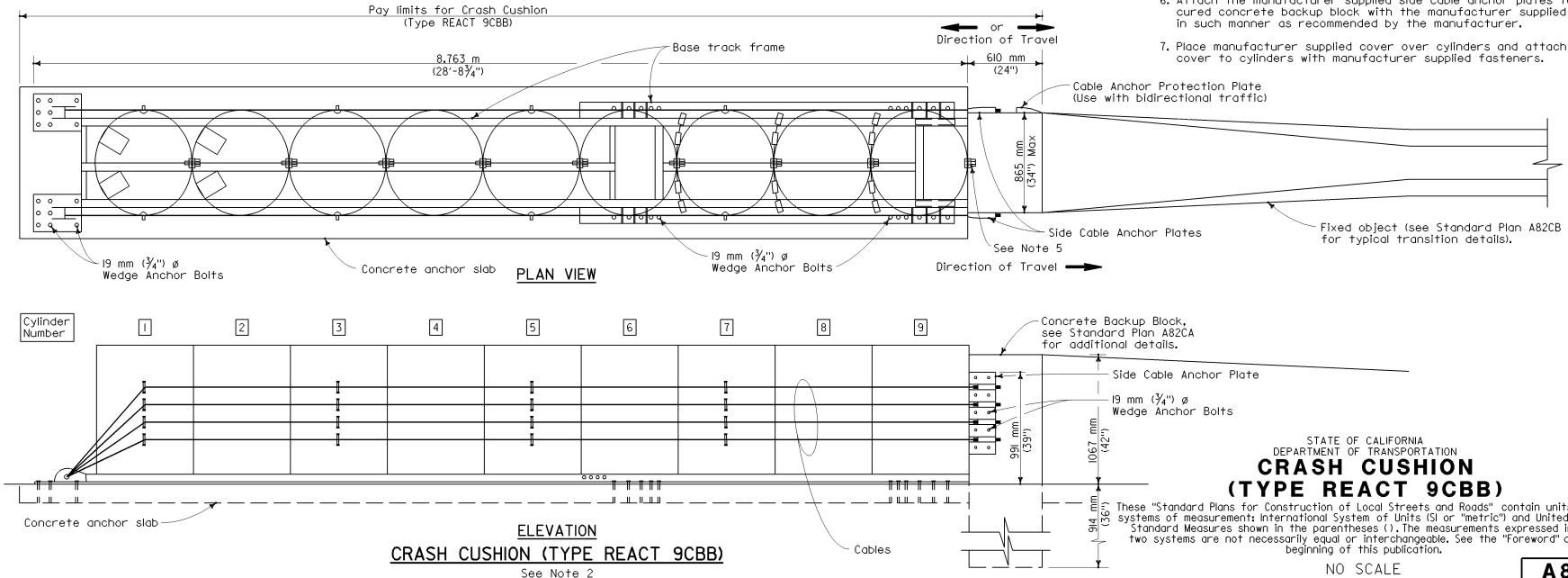
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
CRASH CUSHION
(TYPE ADIEM)

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A82B



SECTION A-A CONCRETE ANCHOR SLAB



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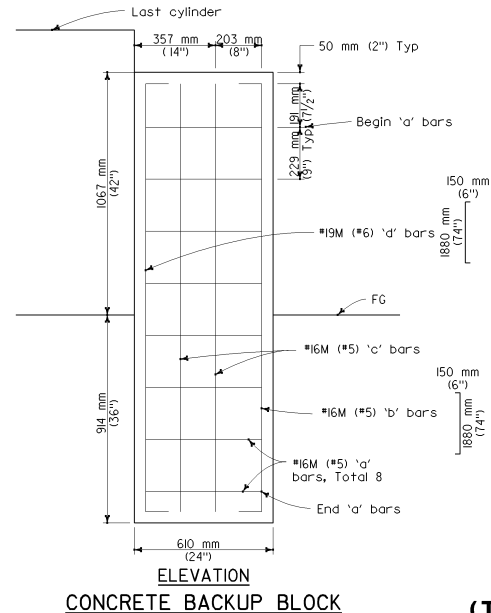
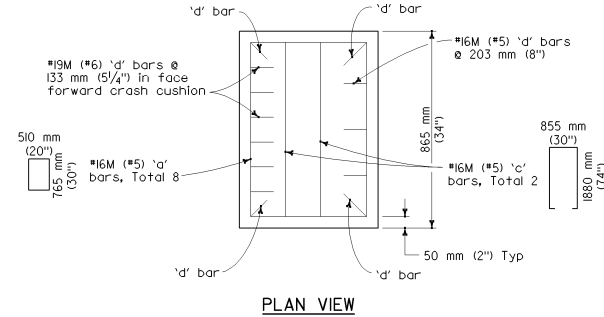
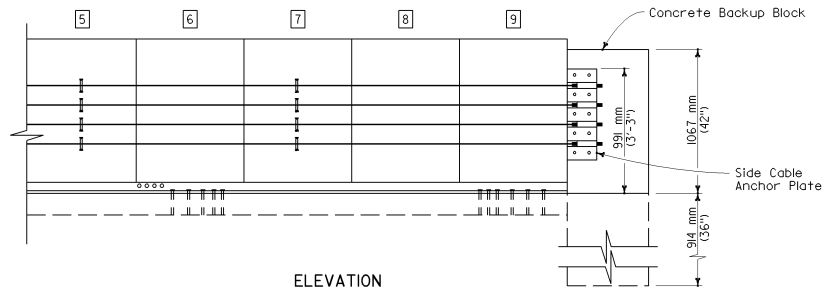
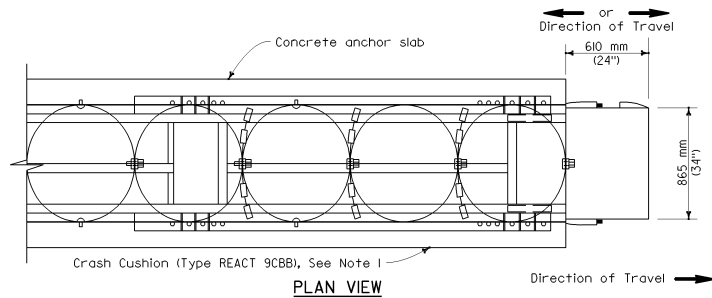
REGISTERED PROFESSIONAL ENGINEER
 Ellis K. Hirst
 No. C17926
 Exp. 6-30-05
 CIVIL
 STATE OF CALIFORNIA

NOTES

- For additional details of this crash cushion, refer to manufacturer's installation instructions.
- For details of the REACT Crash Cushion with self contained backup support (no concrete backup block), see Standard Plan A82D.
- The base track frame with cylinders attached comes from the manufacturer as a completely pre-assembled unit.
- Place the crash cushion unit on the cured concrete anchor slab and use the base track frame of the crash cushion as a template for drilling anchor bolt holes. Drill holes in slab and attach crash cushion with wedge anchor bolts supplied by the manufacturer.
- Attach last cylinder to concrete backup block with manufacturer supplied fastener in such manner as recommended by the manufacturer.
- Attach the manufacturer supplied side cable anchor plates to the cured concrete backup block with the manufacturer supplied bolts in such manner as recommended by the manufacturer.
- Place manufacturer supplied cover over cylinders and attach cover to cylinders with manufacturer supplied fasteners.

NOTES

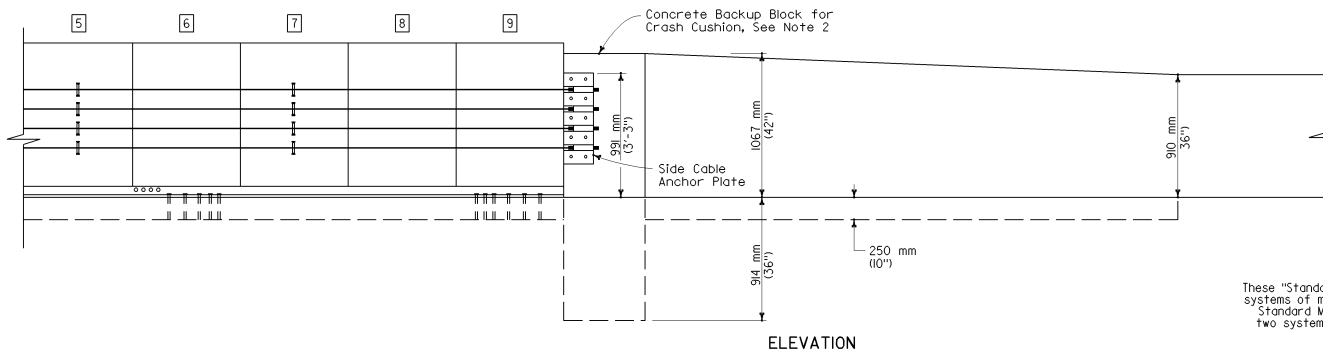
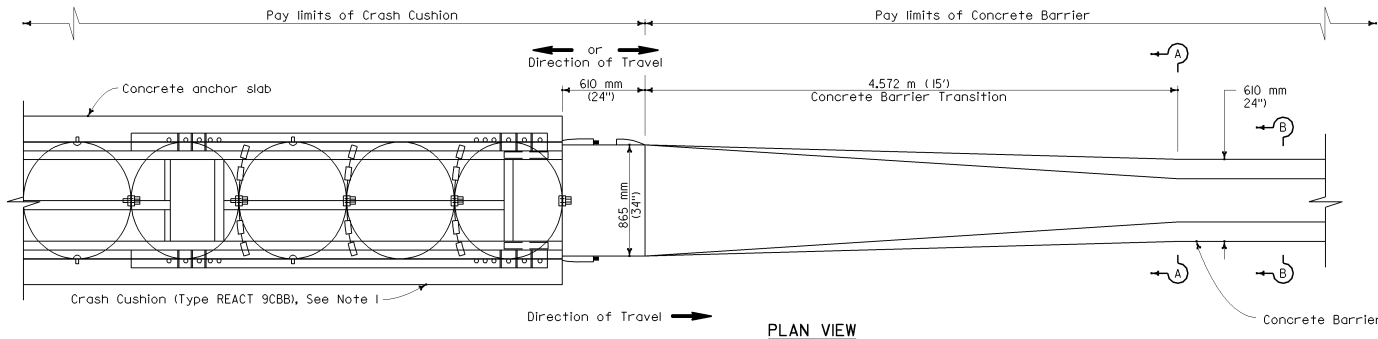
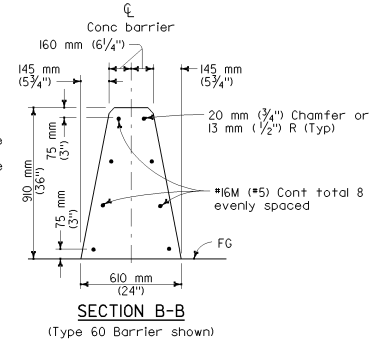
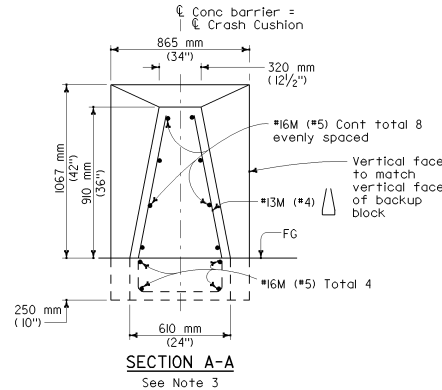
1. For additional details of Crash Cushion (Type REACT 9CBB), see Standard Plan A82C.
2. For transition details of fixed object to backup block, see Standard Plan A82CB.
3. For details of the REACT Crash Cushion with self contained backup support (no concrete backup block), see Standard Plan A82D.



DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
<p><i>Ellis K. Wirst</i></p> <p>REGISTERED CIVIL ENGINEER</p> <p>July 1, 2002</p> <p>PLANS APPROVAL DATE</p> <p>The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.</p> <p>Caltrans now has a web site. To get to the web site, go to http://www.dot.ca.gov</p>					
<p>STATE OF CALIFORNIA</p> <p>DEPARTMENT OF TRANSPORTATION</p> <p>CRASH CUSHION</p> <p>(TYPE REACT 9CBB)</p> <p>BACKUP BLOCK DETAILS</p> <p>NO SCALE</p> <p>A82CA</p>					

NOTES

- For additional details of Crash Cushion (Type REACT 9CBB), see Standard Plan A82C.
- For additional details of the concrete backup block, see Standard Plan A82CA.
- Transitions for other types of concrete barrier similar to that shown for Type 60.



DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
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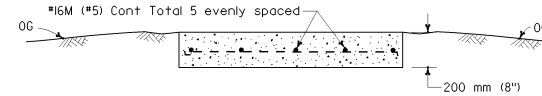
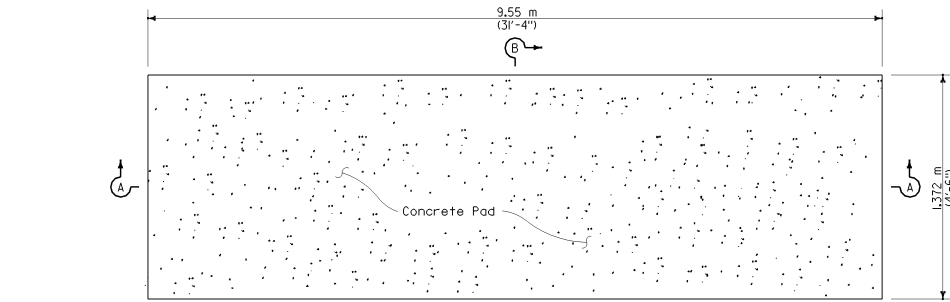
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STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**CRASH CUSHION
(TYPE REACT 9CBB)
CONCRETE BARRIER
TRANSITION DETAILS**

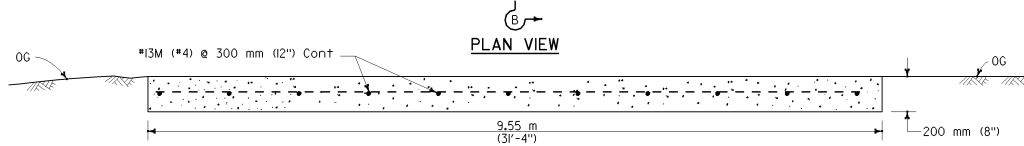
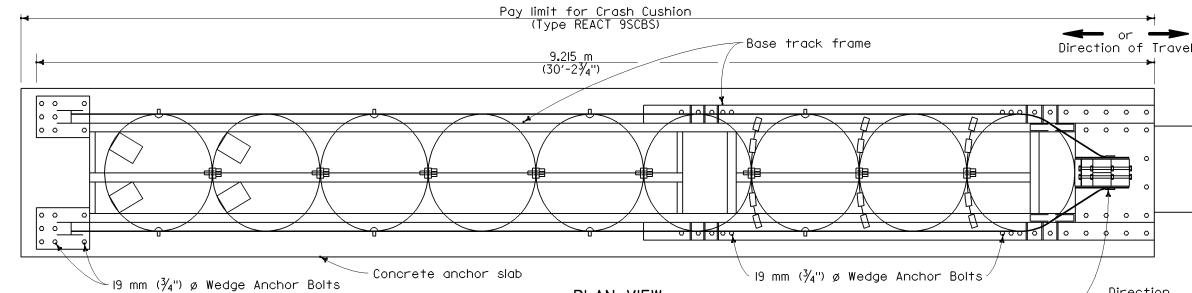
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NO SCALE

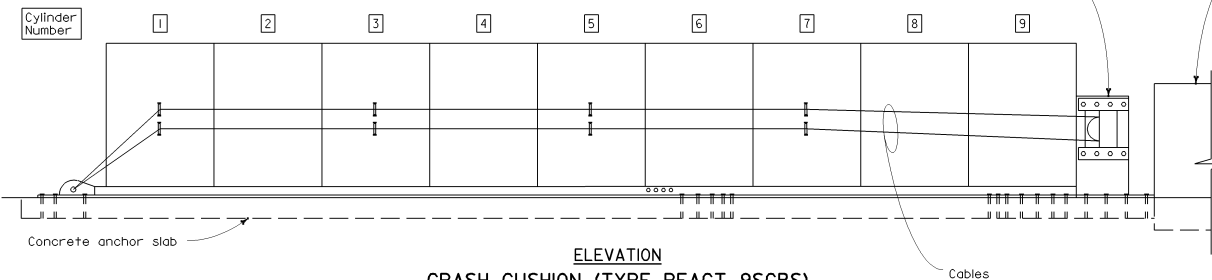
A82CB



SECTION B-B

SECTION A-A
CONCRETE ANCHOR SLAB

PLAN VIEW

ELEVATION
CRASH CUSHION (TYPE REACT 9SCBS)

See Note 2

NOTES

1. For additional details of this crash cushion, refer to manufacturer's installation instructions.
2. For details of the REACT Crash Cushion with concrete backup block (no self contained backup support), see Standard Plan A82C.
3. This crash cushion comes from the manufacturer as a completely pre-assembled unit, including the self contained cable backup support.
4. Place the crash cushion unit on the cured concrete anchor slab and use the base track frame of the crash cushion as a template for drilling anchor bolt holes. Drill holes in slab and attach crash cushion with wedge anchor bolts supplied by the manufacturer.
5. Place manufacturer supplied cover over cylinders and attach cover to cylinders with manufacturer supplied fasteners.

Fixed Object, see Standard Plan A82DA for alignment and connection details of crash cushion with the fixed object.

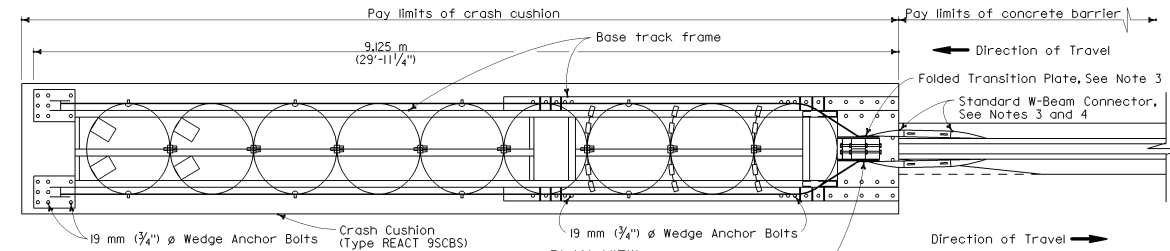
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
CRASH CUSHION
(TYPE REACT 9SCBS)

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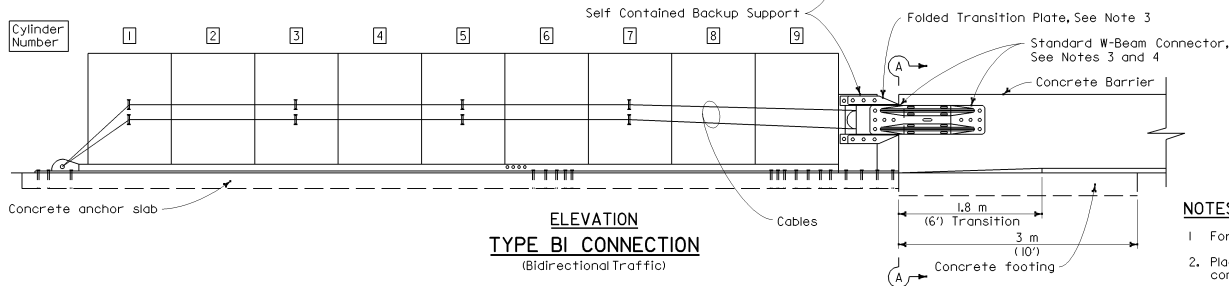
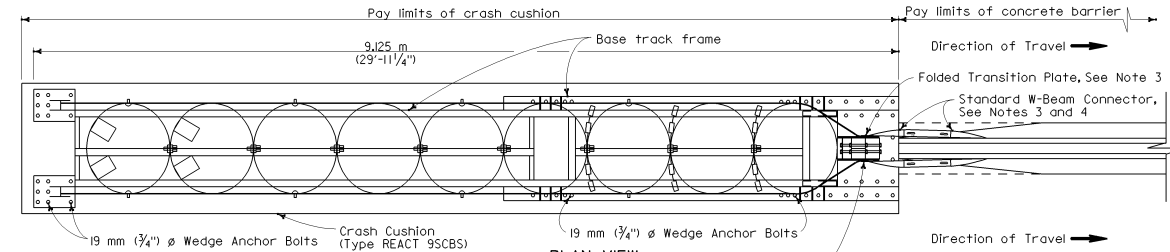
NO SCALE

A82D

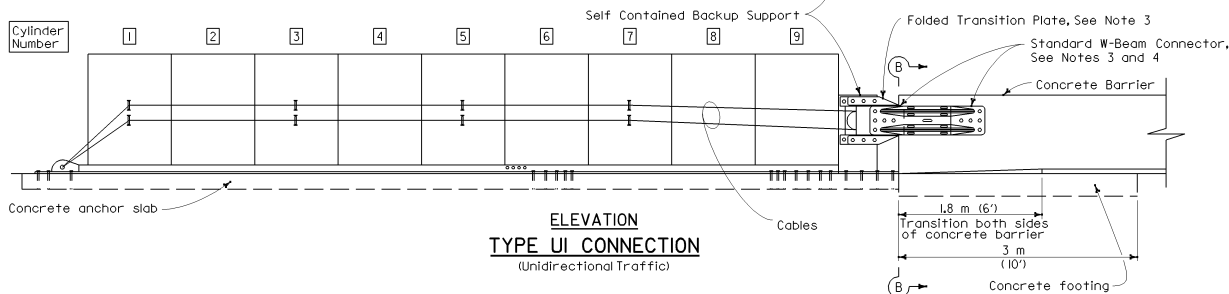
DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
<p><i>Ellis K. Hirst</i> REGISTERED CIVIL ENGINEER</p> <p>July 1, 2002 PLANS APPROVAL DATE</p> <p>The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.</p> <p>Caltrans now has a web site! To get to the web site, go to: http://www.dot.ca.gov</p>					
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PLAN VIEW

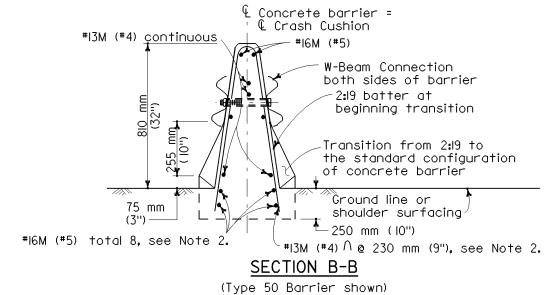
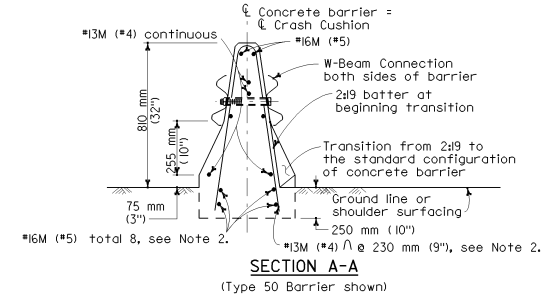
ELEVATION
TYPE BI CONNECTION
(Bidirectional Traffic)

PLAN VIEW

ELEVATION
TYPE UI CONNECTION
(Unidirectional Traffic)

NOTES

- For additional details of Crash Cushion (Type REACT 9SCBS), see Standard Plan A820.
- Place this reinforcement for the full 3 m (10') length of the terminus of the concrete barrier.
- Attach manufacturer supplied folded transition plates and W-Beam connectors to backup support with manufacturer supplied bolts.
- Attach W-Beam Connectors to barrier with manufacturer supplied anchor bolts in the manner recommended by the manufacturer.



STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**CRASH CUSHION
(TYPE REACT 9SCBS)
CONNECTION TO
CONCRETE BARRIER**

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NO SCALE

A82DA

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

Ellis K. Wirst
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July 1, 2002
PLANS APPROVAL DATE

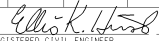
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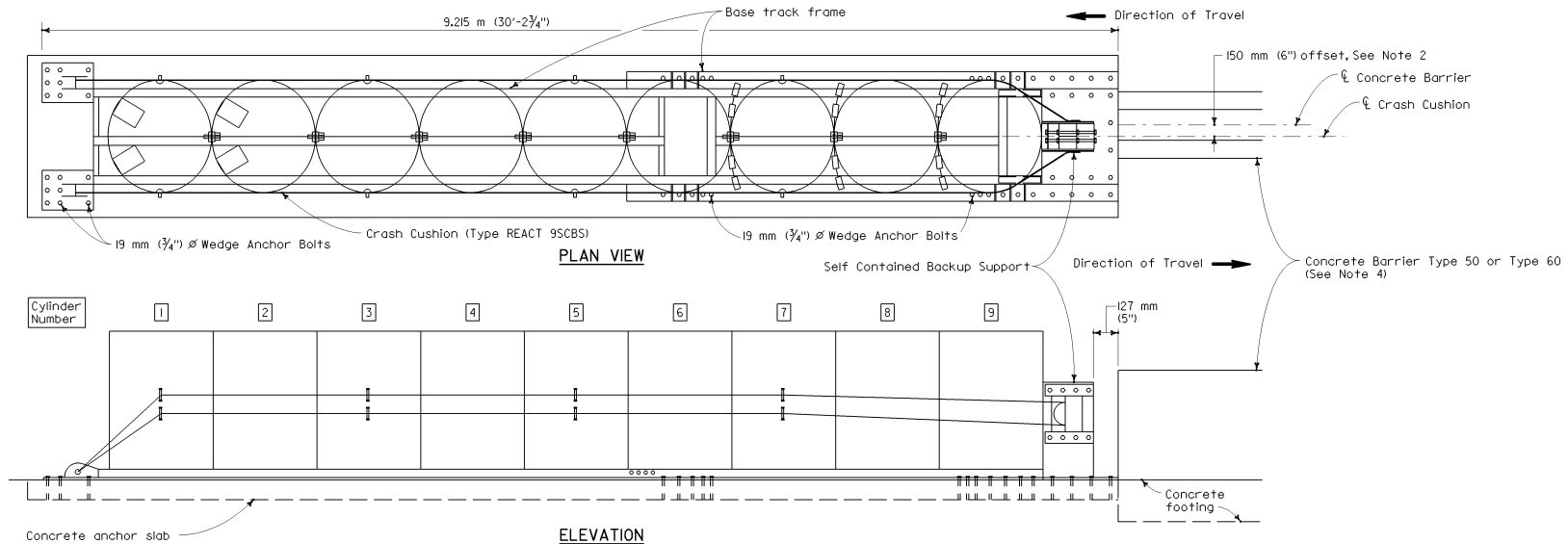
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No. 617926
Exp. 6-30-05
STATE OF CALIFORNIA

NOTES:

1. For additional details of Crash Cushion (Type REACT 9SCBS), see Standard Plan A82D.
2. The 150 mm (6") offset of the centerline of the crash cushion from the centerline of barrier is only to be used for bidirectional traffic locations.
3. Where sufficient median width is not available to offset the crash cushion, as shown, see Standard Plans A82DA and A82CB.
4. For details of typical concrete barrier end anchorage, see Standard Plan A76B.

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
 REGISTERED CIVIL ENGINEER No. C17926 Exp. 6-30-05 STATE OF CALIFORNIA					
July 1, 2002 PLANS APPROVAL DATE <small>The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.</small> Caltrans now has a web site! To get to the web site, go to: http://www.dot.ca.gov					



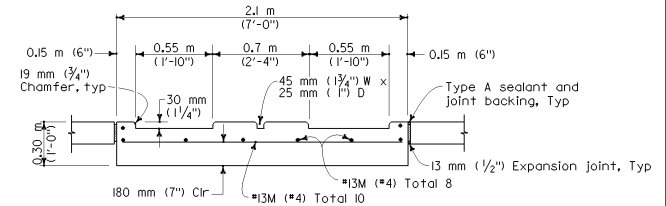
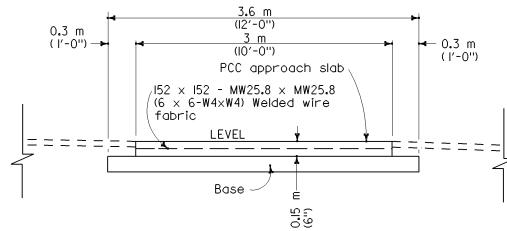
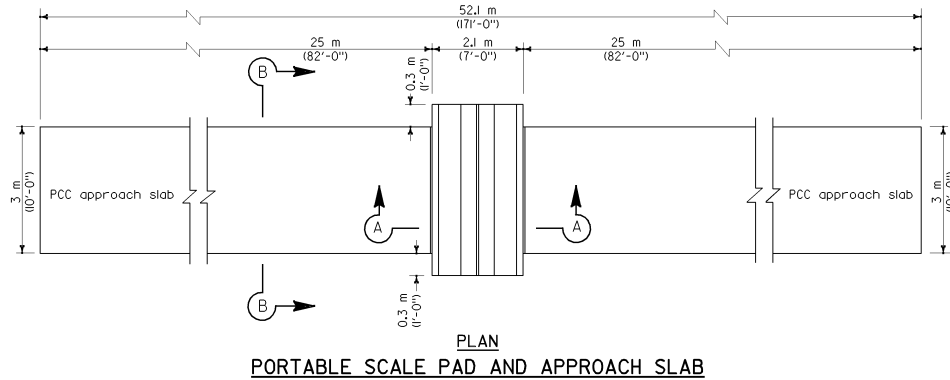
ELEVATION
TYPE BOI CONNECTION
 (Bidirectional Traffic)
 See Notes 2 and 3

STATE OF CALIFORNIA
 DEPARTMENT OF TRANSPORTATION
CRASH CUSHION
(TYPE REACT 9SCBS)
ALIGNMENT OFFSET DETAILS

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NO SCALE

A82DB



NOTES

1. PCC portable scale pad and PPC approach slabs shall be level in all directions.
2. See Typical Cross Section on Project Plans for limits and thickness of structural section.

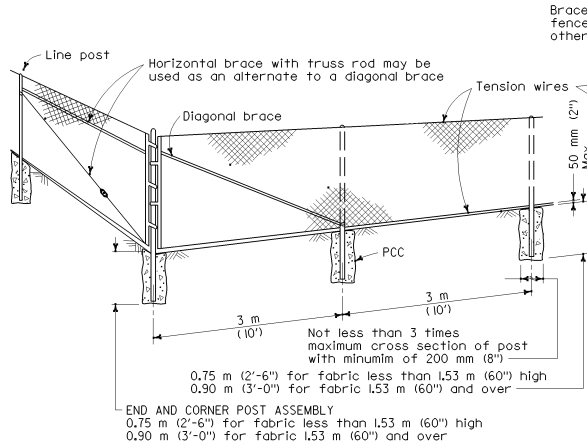
STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION **PORTABLE SCALE PAD AND APPROACH SLAB DETAILS**

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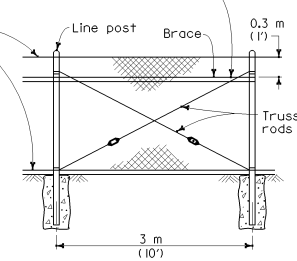
NO SCALE

A83

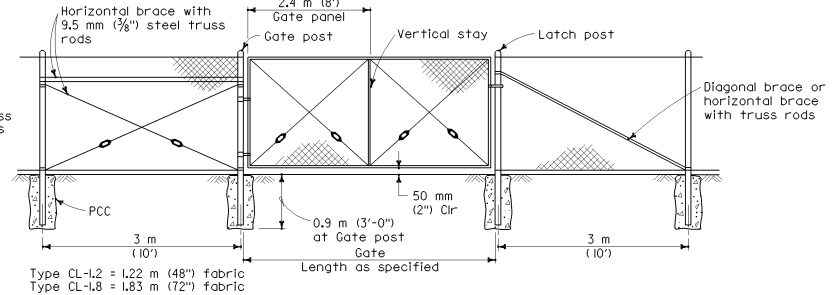
DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
Kevin M. Herriott REGISTERED CIVIL ENGINEER July 1, 2002 PLANS APPROVAL DATE The State of California or its officers or agents shall not be responsible for the accuracy or completeness or electronic copies of this plan sheet. Caltrans now has a web site! To get to the web site, go to: http://www.dot.ca.gov					
Kevin M. Herriott No. C36517 Exp. 6-30-04 CIVIL STATE OF CALIFORNIA					



Brace to be removed after all other fence construction is completed unless otherwise directed by the Engineer.

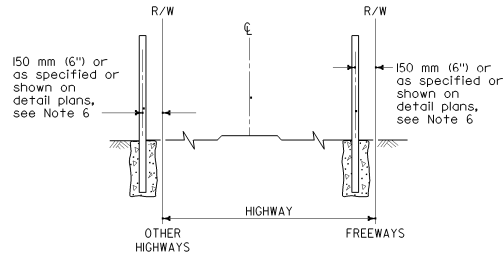


Line posts at 300 m (1000') maximum intervals braced and trussed in both directions except that this bracing and trussing may be omitted when the fabric is stretched by the equipment.



TYPICAL MEMBER DIMENSIONS (See Notes)

FENCE HEIGHT	LINE POSTS				END, LATCH & CORNER POSTS			BRACES			
	ROUND ID	H	ROLL FORMED	ROLL FORMED	ROUND ID	H	ROLL FORMED	ROUND ID	H	ROLL FORMED	ROLL FORMED
1.83 m (6') & less	40 mm (1 1/2")	48 mm x 41 mm (1 7/8" x 1 5/8")	48 mm x 41 mm (1 7/8" x 1 5/8")	50 mm (2")	89 mm x 89 mm (3 1/2" x 3 1/2")	51 mm x 44 mm (2" x 1 3/4")	32 mm (1 1/4")	38 mm x 33 mm (1 1/2" x 1 5/8")	41 mm x 32 mm (1 5/8" x 1 1/4")	44 mm x 32 mm (1 3/4" x 1 1/4")	
Over 1.83 m (6')	50 mm (2")	57 mm x 51 mm (2 1/4" x 2")	51 mm x 44 mm (2" x 1 3/4")	63 mm (2 1/2")	89 mm x 89 mm (3 1/2" x 3 1/2")	63 mm x 63 mm (2 1/2" x 2 1/2")	32 mm (1 1/4")	38 mm x 33 mm (1 1/2" x 1 5/8")	41 mm x 32 mm (1 5/8" x 1 1/4")	44 mm x 32 mm (1 3/4" x 1 1/4")	



FENCE LOCATION

NOTES

- The above table shows examples of post and brace sections which may comply with the Specifications.
- Sections shown in the tables must also comply with the strength requirements and other provisions of the Specifications.
- Other sections which comply with the strength requirements and other provisions of the Specifications may be used on approval of the Engineer.
- Options exercised shall be uniform on any one project.
- Dimensions shown are nominal.
- Offset to be 0.60 m (2'-0") at monument locations, measured at right angles to R/W lines. Taper to achieve offset to be at least 6 m (20') long.

DIST	COUNTY	ROUTE	KILOMETER TOTAL PROJECT	POST NO.	SHEET TOTAL SHEETS
<p>Glenn DeCou REGISTERED CIVIL ENGINEER</p> <p>July 1, 2002 PLANS APPROVAL DATE</p> <p>The State of California or its officers or agents shall not be responsible for the accuracy or completeness or electronic copies of this plan sheet.</p> <p>Caltrans now has a web site! To get to the web site, go to: http://www.dot.ca.gov</p>					

GATE POST			
FENCE HEIGHT	GATE WIDTHS	NOMINAL ID	MASS PER METER (WEIGHT PER FOOT)
1.83 m (6') and less	Up thru 1.83 m (6')	65 mm (2 1/2")	7.37 kg (4.95 lbs)
	Over 1.83 m (6') thru 3.66 m (12')	100 mm (4")	16.06 kg (10.79 lbs)
	Over 3.66 m (12') thru 5.49 m (18')	125 mm (5")	21.76 kg (14.62 lbs)
	Over 5.49 m (18') thru 7.32 m (24') Max	150 mm (6")	28.23 kg (18.97 lbs)
Over 1.83 m (6')	Up thru 1.83 m (6')	80 mm (3")	11.28 kg (7.58 lbs)
	Over 1.83 m (6') thru 3.66 m (12')	125 mm (5")	21.76 kg (14.62 lbs)
	Over 3.66 m (12') thru 5.49 m (18')	150 mm (6")	28.23 kg (18.97 lbs)
	Over 5.49 m (18') thru 7.32 m (24') Max	200 mm (8")	42.49 kg (28.55 lbs)

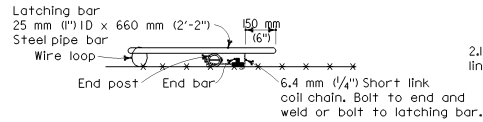
Above post dimensions and masses are minimums. Larger sizes may be used on approval from the Engineer.

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION CHAIN LINK FENCE

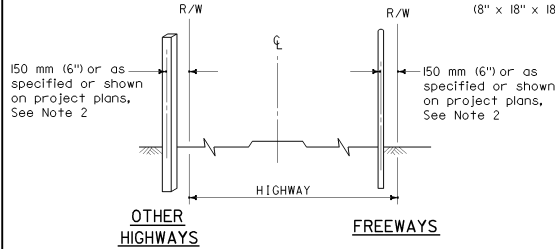
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NO SCALE

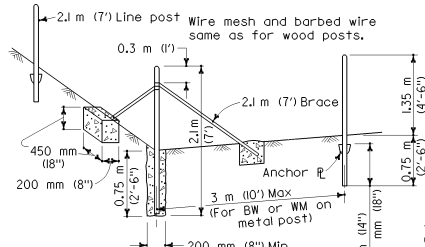
A85



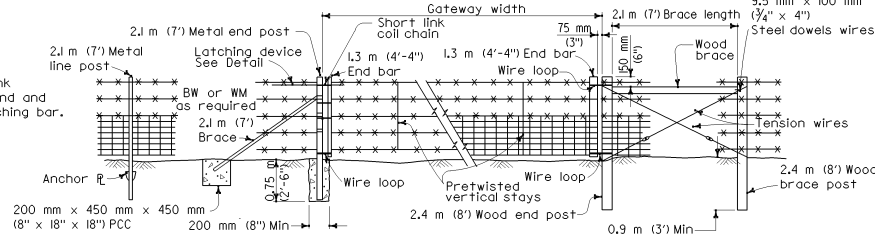
**LATCHING DEVICE
FOR GATEWAYS**
See Note 1



FENCE LOCATION



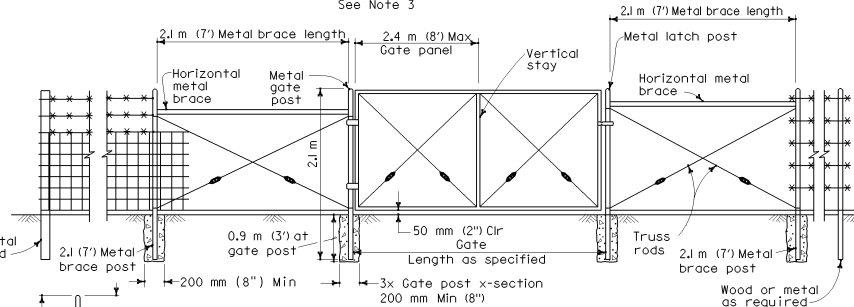
END AND CORNER POST ASSEMBLY



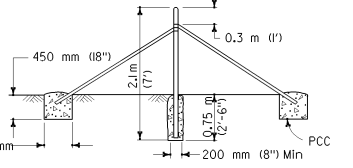
METAL POST INSTALLATION

WOOD POST INSTALLATION

GATEWAY
See Note 3



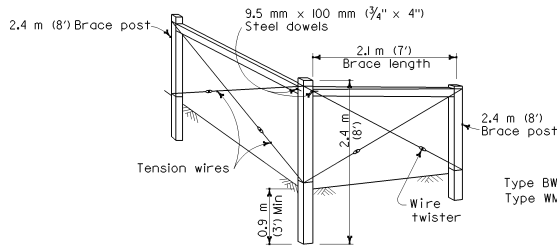
**WIRE MESH GATE INSTALLATION FOR
EITHER WOOD OR METAL POST FENCES**



PULL POST ASSEMBLY

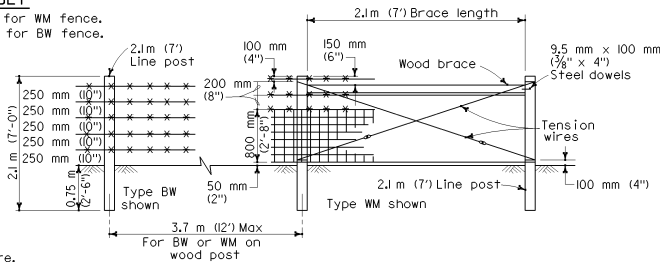
At 200 m (660') Maximum intervals for WM fence.
At 400 m (1320') Maximum intervals for BW fence.

METAL POST INSTALLATION



END AND CORNER POST ASSEMBLY

Type BW = 5 lines of barbed wire.
Type WM = Wire mesh and 3 lines of barbed wire.



PULL POST ASSEMBLY

At 200 m (660') maximum intervals for WM fence.
At 400 m (1320') maximum intervals for BW fence.

WOOD POST INSTALLATION

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

July 1, 2002
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STATE OF CALIFORNIA

WIRE MESH GATE POST
(See Note 4)

GATE WIDTHS	NOMINAL ID	MASS PER METER ((WEIGHT PER FOOT)
Up thru 1.83 m (6')	65 mm (2 1/2")	7.37 kg (4.95 lbs)
Over 1.83 m (6') thru 3.66 m (12')	90 mm (3 1/2")	13.56 kg (9.11 lbs)
Over 3.66 m (12') thru 5.49 m (18')	125 mm (5")	21.76 kg (14.62 lbs)
Over 5.49 m (18') to 7.32 m (24') Max	150 mm (6")	28.23 kg (18.97 lbs)

NOTES

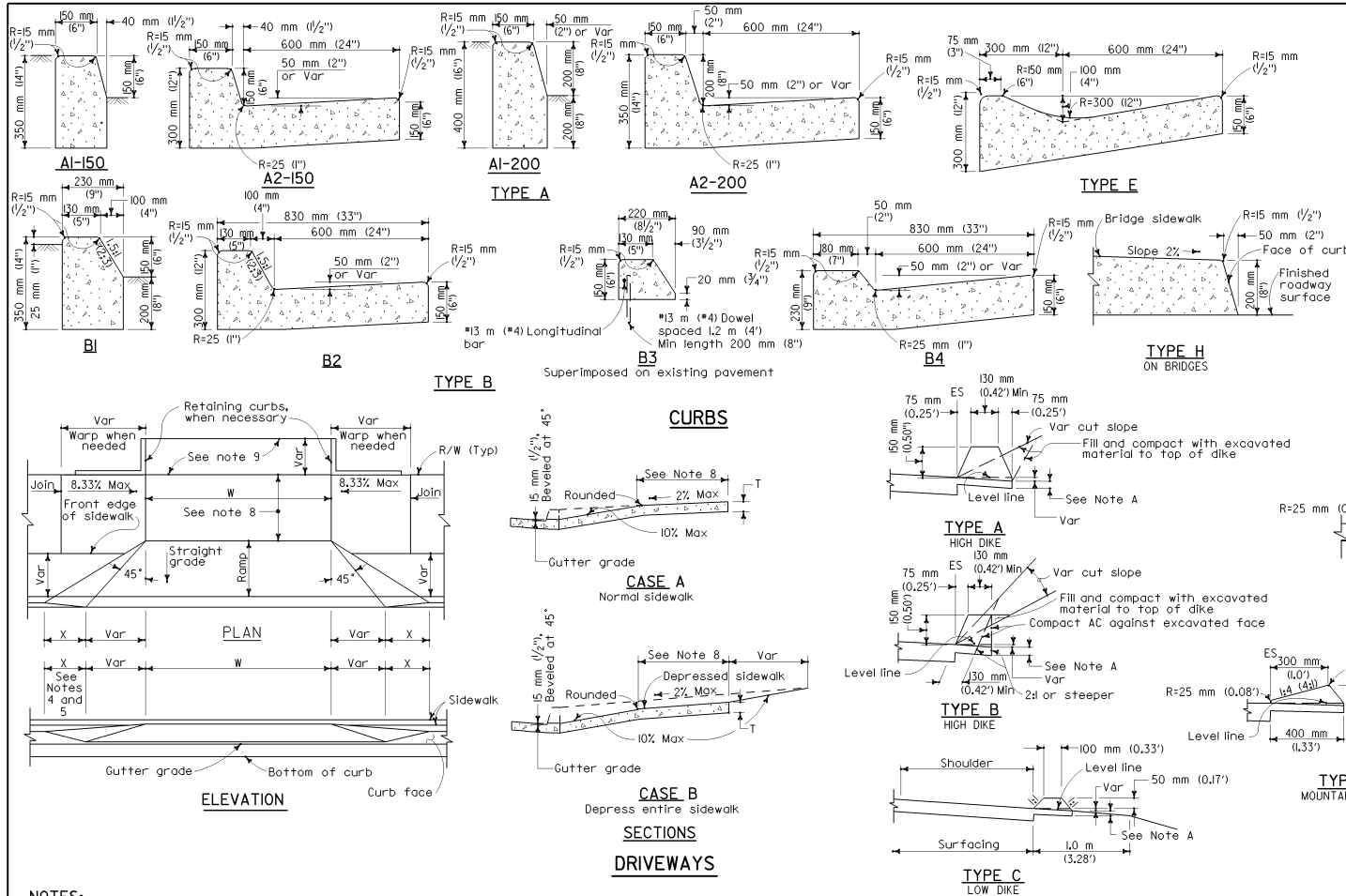
1. Metal end post and end bar shown. Use wood end post and end bar for wood post installation.
2. Offset to be 0.6 m (2') at monument locations, measured at right angles to R/W lines. Taper to achieve offset to be at least 6 m (20') long.
3. Gateway to be used when specified in the special provisions.
4. Post dimensions and masses are minimums. Larger sizes may be used on approval of the Engineer.
5. Line post spacing for wood post equals 3.7 m (12') maximum. Line post spacing for metal post equals 3 m (10') maximum.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**BARBED WIRE AND
WIRE MESH FENCES**

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NO SCALE

A86



NOTES:

1. Case A normally applies.
2. Use Case B when ramp slopes would exceed 10% in Case A.
3. Use Case B when sidewalk cross slope would exceed 2% in Case A.
4. x=900 mm (3'-0") except for curb heights over 250 mm (10") where 14 (41) slopes shall be used on curb slope.
5. X is variable when sidewalk is located where wheelchairs may traverse the surface. Slopes shall be 8.33% maximum.
6. Sidewalk and ramp thickness "T" at driveway shall be 100 mm (4") for residential and 150 mm (6") for commercial.

7. Difference in slope of the driveway ramp and the slope of a line between the gutter and a point on the roadway 1.5 m (5') from gutter line shall not exceed 15%. Reduce driveway ramp slope, not gutter slope, where required.
8. Minimum width of clear passage shall be 1.22 m (48"). Where right of way restrictions, natural barriers or other existing conditions create an unreasonable hardship, the clear width may be reduced to 915 mm (36").
9. Retaining curbs and acquisition of construction easement may be necessary for narrow sidewalks or curb heights in excess of 150 mm (6").

ASPHALT CONCRETE DIKES

NOTE A - Extend top layer of AC placed on the shoulder under dike with no joint at the ES

CURBS, DIKES AND DRIVEWAYS

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NO SCALE

A87

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
REGISTERED CIVIL ENGINEER					
July 1, 2002					
PLANS APPROVAL DATE					
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CURB QUANTITIES

TYPE	CUBIC METERS PER METER (CUBIC YARDS PER FOOT)
AI-150	0.064 (0.026)
A2-150	0.144 (0.059)
AI-200	0.075 (0.031)
A2-200	0.155 (0.064)
B1	0.073 (0.029)
B2	0.152 (0.062)
B3	0.027 (0.011)
B4	0.142 (0.057)
E	0.161 (0.067)

AC DIKE QUANTITIES

TYPE	CUBIC METERS PER METER (CUBIC YARDS PER FOOT)
A	0.033 (0.013)
B	0.026 (0.010)
C	0.009 (0.004)
D	0.065 (0.027)
E	0.027 (0.011)
F	0.016 (0.007)

AC quantities based on 5% cross slope

TYPE F
USE UNDER MBGR

NOTE A - Extend top layer of AC placed on the shoulder under dike with no joint at the ES

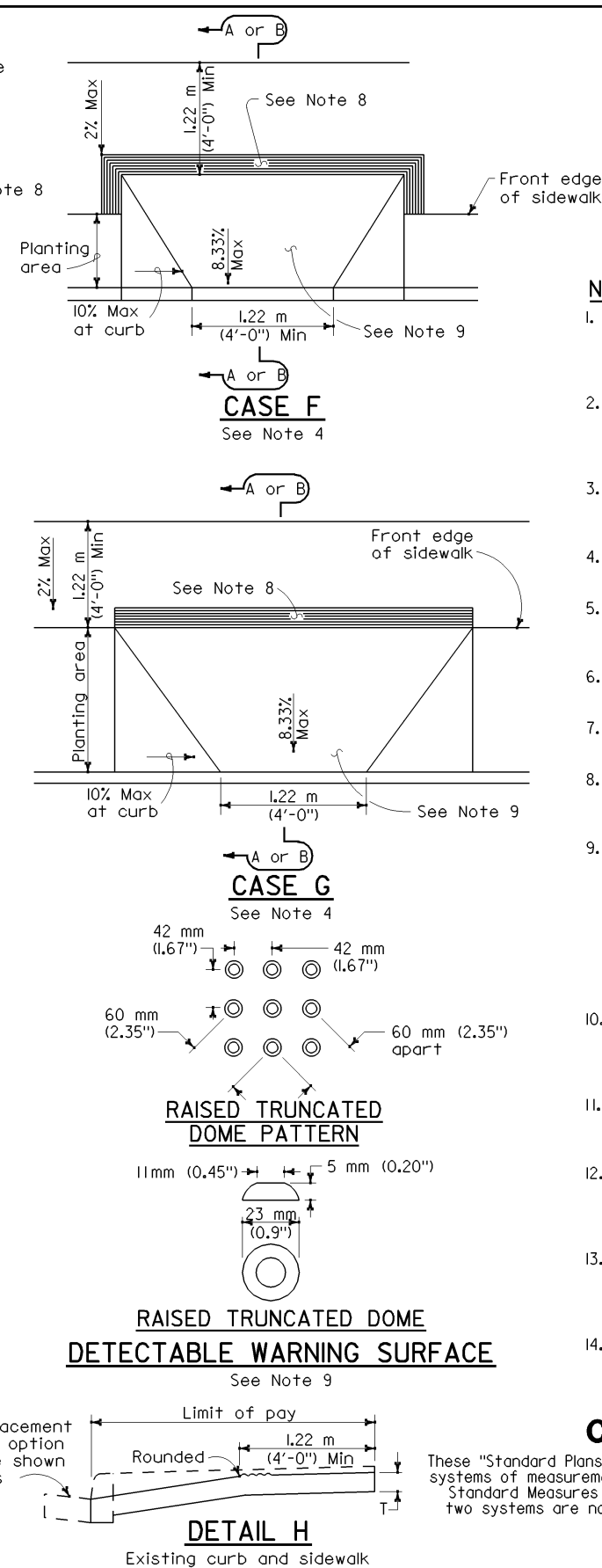
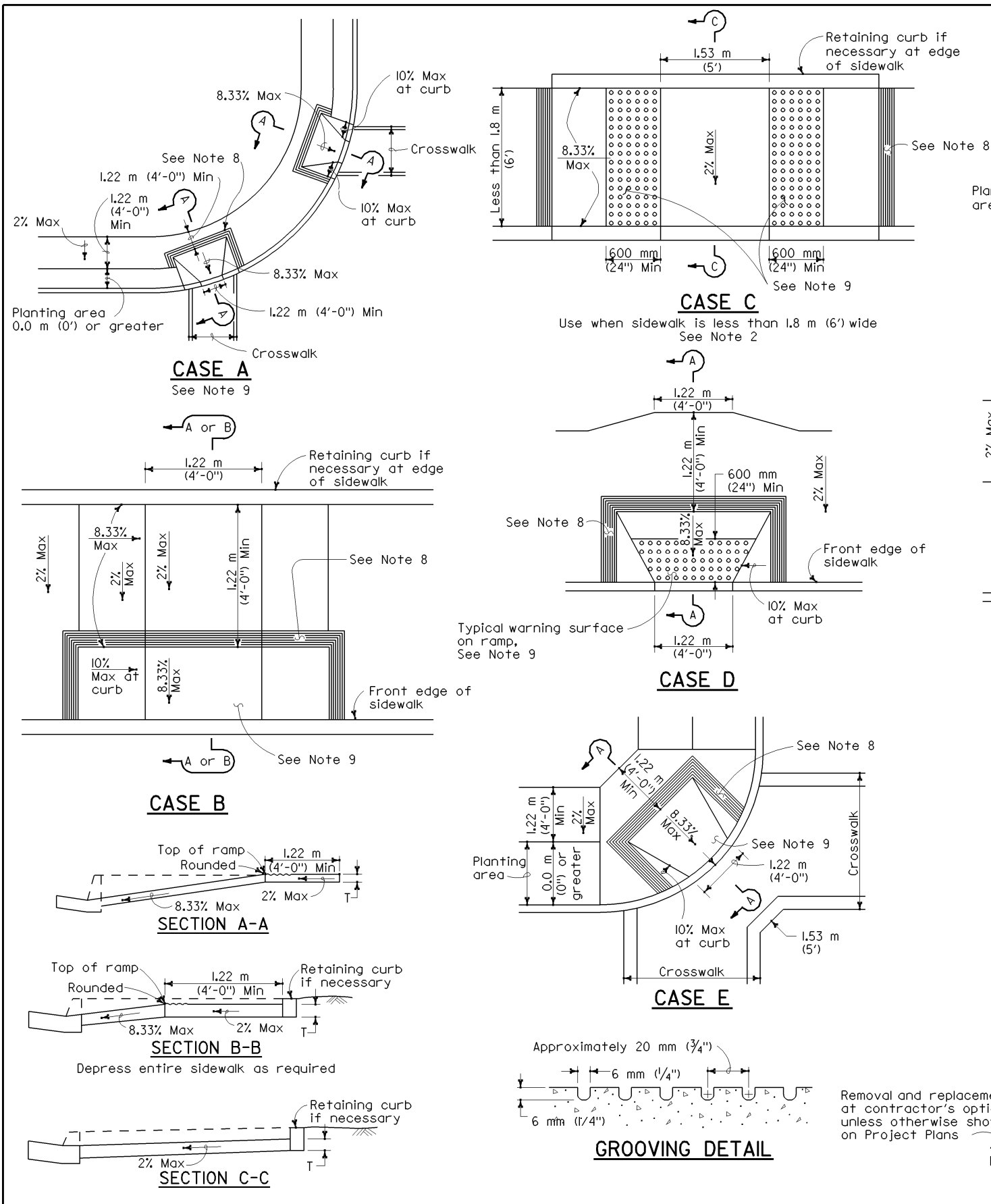
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CURBS, DIKES AND DRIVEWAYS

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NO SCALE

A87



NOTES

1. If distance from curb to back of sidewalk is too short to accommodate ramp and 1.22 m (4'-0") platform as in Case A the sidewalk may be depressed longitudinally as in Case B or C or may be widened as in Case D.
2. If sidewalk is less than 1.8 m (6') wide, the full width of the sidewalk shall be depressed as shown in Case C on this plan or the sidewalk shall be ramped down as shown in Case CM on Standard Plan A88B.
3. When ramp is located in center of curb return, crosswalk configuration must be similar to that shown for Case E to accommodate wheelchairs.
4. For Cases F and G, the longitudinal portion of the sidewalk may need to be depressed as shown in Case B.
5. If located on a curve, the sides of the ramp need not be parallel, but the minimum width of the ramp shall be 1.22 m (4'-0").
6. Transitions from ramps to walks, gutters, or streets shall be flush and free of abrupt changes.
7. Sidewalk and ramp thickness, "T", shall be 90 mm (3 1/2") minimum.
8. The ramp shall have a 300 mm (12") wide border with 6 mm (1/4") grooves approximately 20 mm (3/4") on center. See grooving detail.
9. Curb ramps that have a ramp slope flatter than 6.67% shall have a detectable warning surface that extends the full width of the ramp and 600 mm (24") minimum length, similar to that shown on Case D. Detectable Warning Surfaces, at the option of the Contractor, shall be constructed by cast-in-place or stamped method, or consist of a prefabricated surface. The prefabricated surface shall conform to the requirements in the Special Provisions.
10. When detectable warning surface is not required on a curb ramp, the concrete finish of the ramp and its flares sides shall have a transverse broomed surface texture rougher than the surrounding sidewalk.
11. Ramp sides slope varies uniformly from a maximum of 10% at curb to conform with longitudinal sidewalk slope adjacent to top of the ramp, except in Case C.
12. Utility pull boxes, manholes, vaults and all other utility facilities within the boundaries of the curb ramp will be relocated or adjusted to grade by the owner prior to, or in conjunction with, curb ramp construction.
13. Maximum slopes of adjoining gutters, the road surface immediately adjacent to the curb ramp and continuous passage to the curb ramp shall not exceed 5% within 1.22 m (4'-0") of the top or bottom of the curb ramp.
14. Design details approved by the Division of the State Architect on March 18, 1996.

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CURB RAMP DETAILS

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NO SCALE

A88A

DIST	COUNTY	ROUTE	KILOMETER TOTAL PROJECT	POST NO.	SHEET NO.	TOTAL SHEETS


REGISTERED CIVIL ENGINEER
Hector David Cordova
No. C41957
Exp. 3-31-04
CIVIL
STATE OF CALIFORNIA

July 1, 2002
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DIST	COUNTY	ROUTE	KILOMETER TOTAL PROJECT	POST NO.	SHEET NO.	TOTAL SHEETS



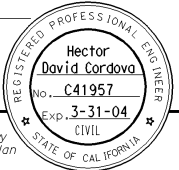
REGISTERED CIVIL ENGINEER

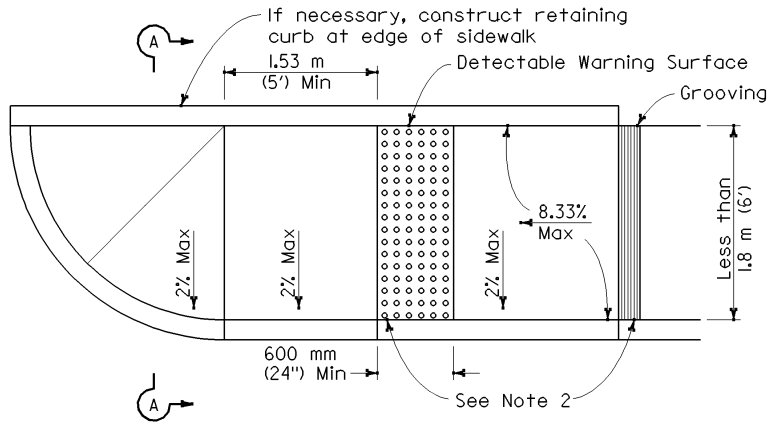
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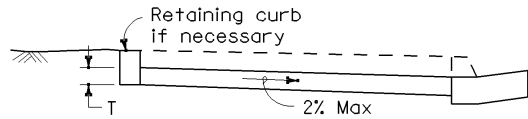
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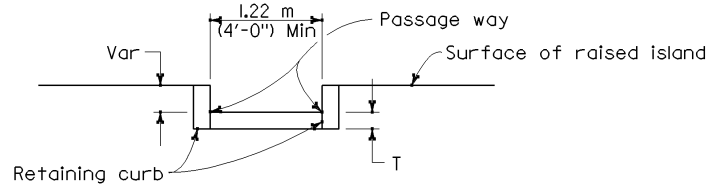


CASE CM CURB RAMP

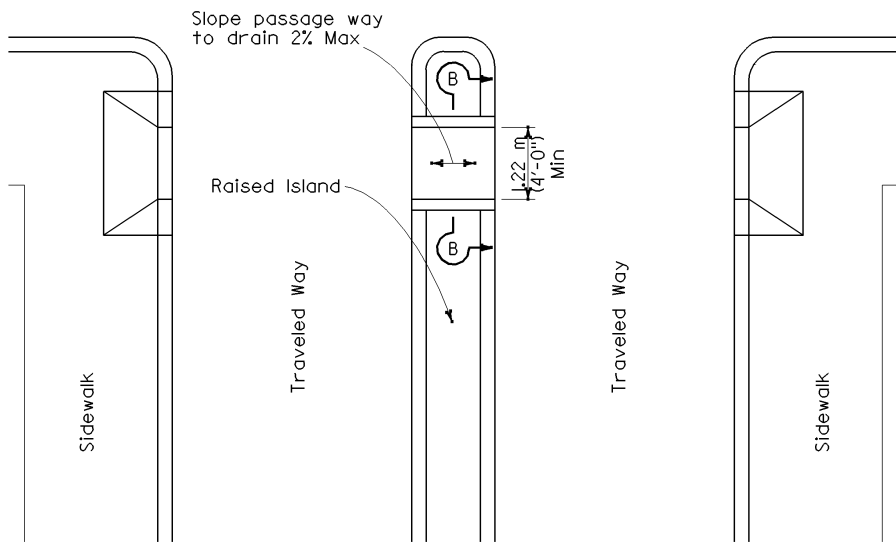
Use when sidewalk is less than 1.8 m (6') wide



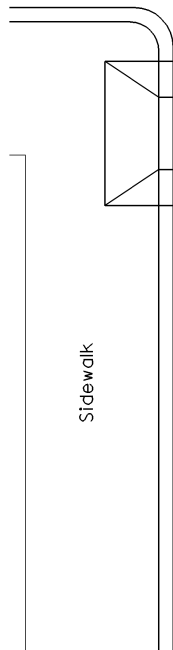
SECTION A-A



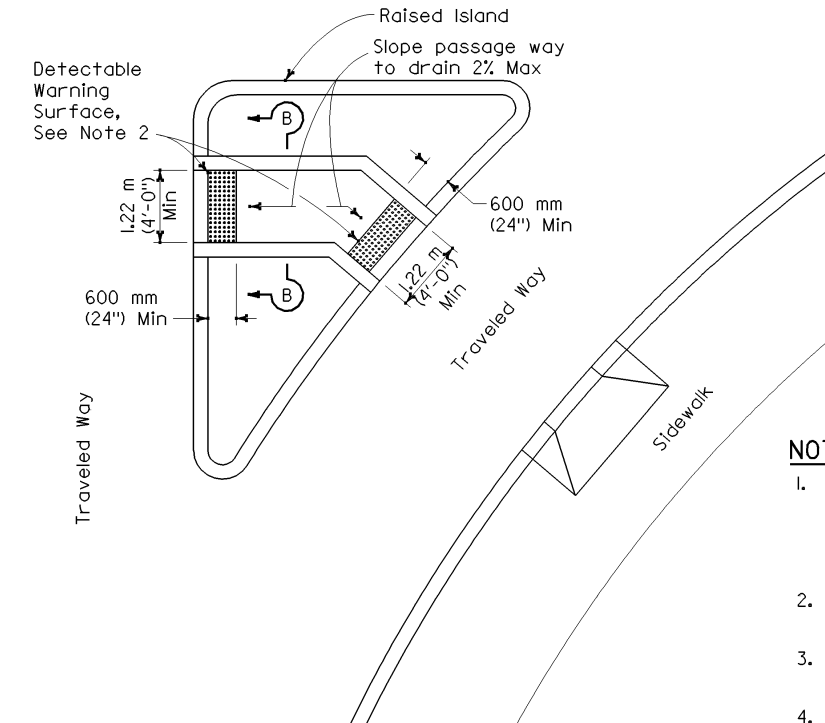
SECTION B-B



TYPE A PASSAGE WAY



TYPE B PASSAGE WAY



TYPE C PASSAGE WAY

NOTES

1. Minimum width of passage way through raised islands shall be 1.22 m (4'-0"), except for locations where right of way restrictions, natural barriers, or other existing conditions create an unreasonable hardship, the clear width of the passage way may be reduced to 915 mm (36").
2. For details of detectable warning surfaces and grooving, see Standard Plan A88A.
3. Transitions from ramps to walks, gutters, or streets shall be flush and free of abrupt changes.
4. Sidewalk, ramp and passage way thickness, "T", shall be 90 mm (3 1/2") minimum.
5. Utility pull boxes, manholes, vaults, and all other utility facilities within the boundaries of the curb ramp will be relocated or adjusted to grade by the owner prior to, or in conjunction with, curb ramp construction.
6. Maximum slopes of adjoining gutters, the road surface immediately adjacent to the curb ramp and continuous passage to the curb ramp shall not exceed 5% within 1.22 m (4'-0") of the top or bottom of the curb ramp.
7. Design details approved by the Division of State Architect on May 27, 1999.

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CURB RAMP DETAILS

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NO SCALE

A88B

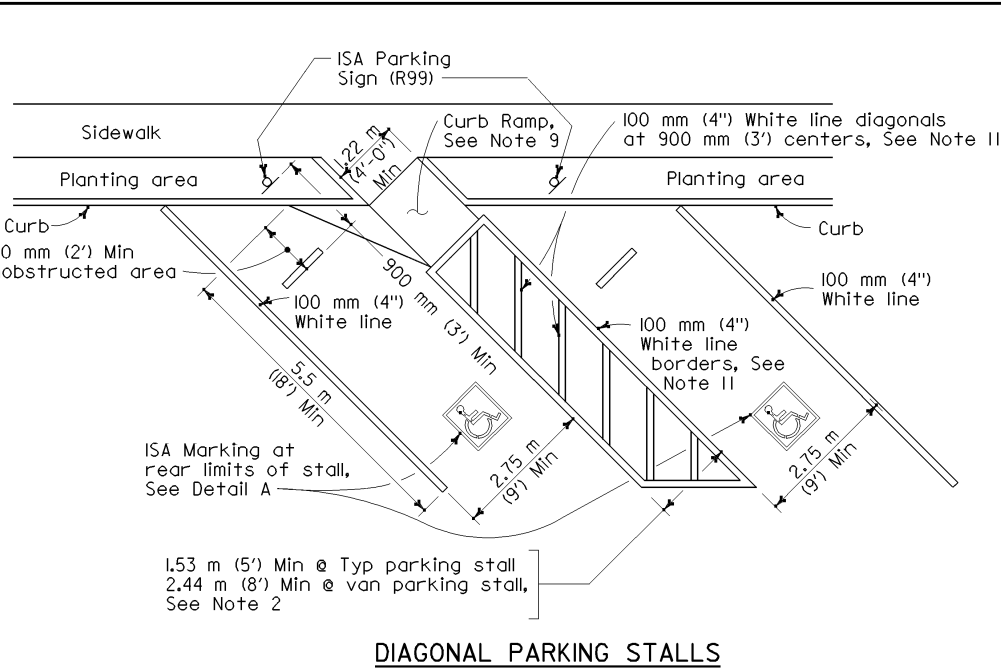
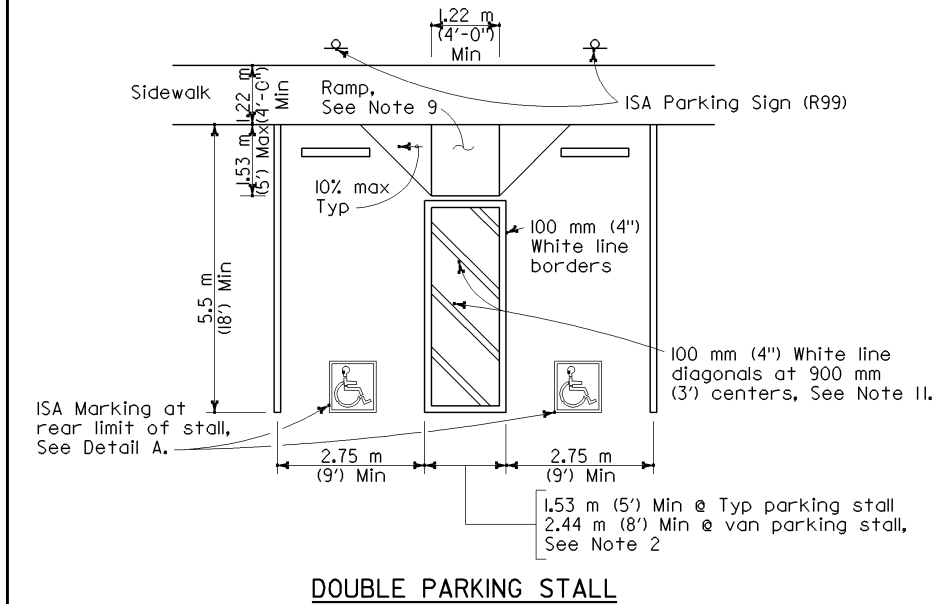
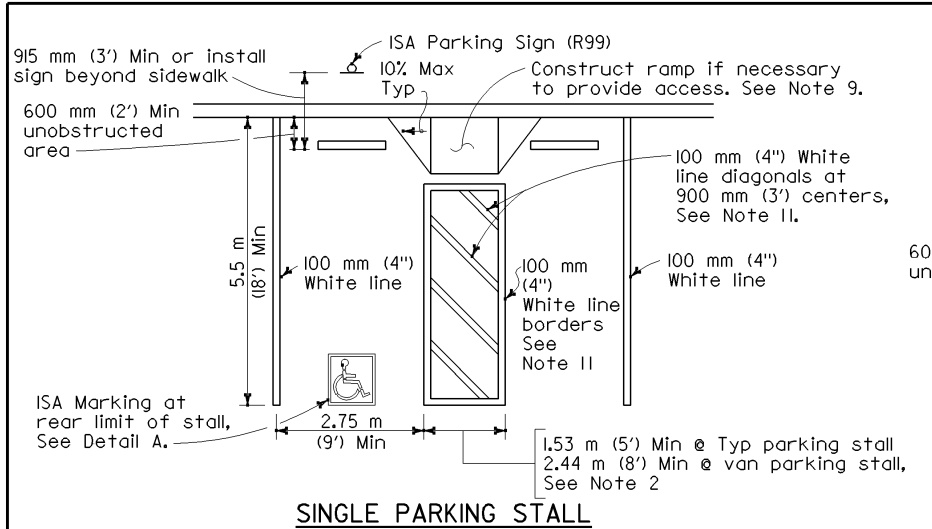
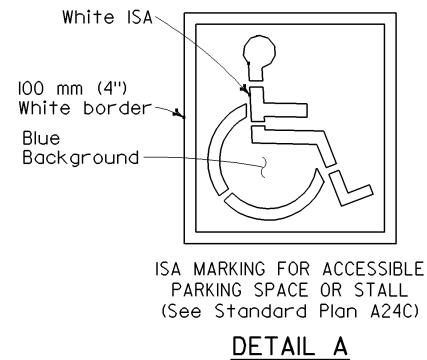
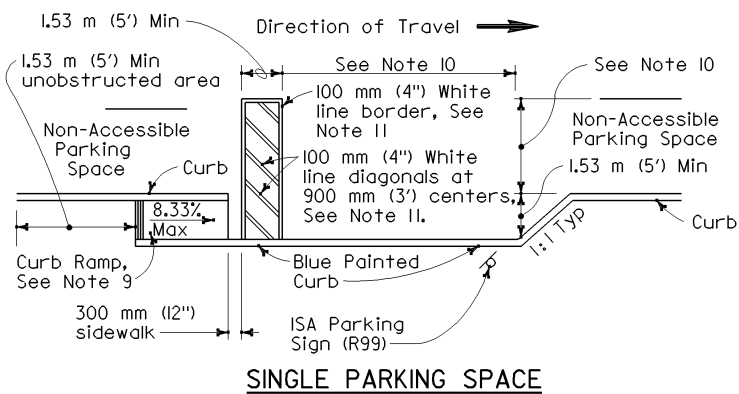
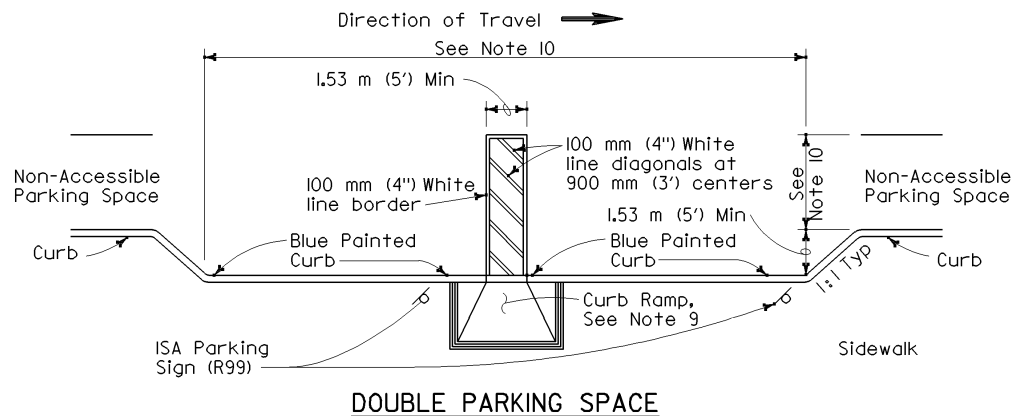


TABLE A

Total Number of Parking Spaces or Stalls	Minimum Number of Disabled Accessible Parking Spaces or Stalls
1-25	1
26-50	2
51-75	3
76-100	4
101-150	5
151-200	6
201-300	7
301-400	8
401-500	9
501-1000	2 percent of total
Greater than 1001	20 plus 1 for each 100 or fraction thereof over 1001



OFF-STREET PARKING
(Parking lot or garage)



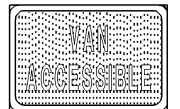
ON-STREET PARKING
(Parallel parking)
See Note 7

NOTES

1. Accessible parking stalls shall be located as close as possible, and on the shortest accessible route of travel, to the pedestrian entrance or exit of the parking lot or garage.
2. One in every eight accessible off-street parking stalls, but not less than one, shall be served by an accessible aisle of 2.44 m (8'-0") minimum width and shall be signed van accessible. The R99A "Van Accessible" sign shall be mounted below the R99 "ISA Parking" sign.
3. In each parking stall, a curb or bumper shall be provided and located to prevent encroachment of vehicles over the required width of walkways. Parking stalls shall be so located that persons with disabilities are not compelled to wheel or walk behind parked cars other than their own.
4. When less than five parking stalls are provided, one stall with a minimum width of 5.19 m (17') shall be made accessible to persons with disabilities. However, there is no requirement that the stall be reserved exclusively or identified for that purpose.
5. Surface slopes of accessible off-street parking stalls shall be the minimum possible and shall not exceed 2% in any direction. Surface slopes of accessible on-street parking stalls shall be the minimum feasible.
6. Table A shall be used to determine the required number of accessible parking stalls in any parking lot or garage.
7. Where new on-street or time limited parking is provided and designated in districts zoned for business use, accessible parking shall be provided in accordance with Table A.
8. Where R99 "ISA Parking" or R99A "Van Accessible" signs are installed on sidewalks or other paths of travel, the bottom of the sign panel shall be a minimum of 2.04 m (6'-8") above the surface of the sidewalk or path. Where R99 or R99A signs are not installed on sidewalks or other paths of travel, the bottom of the sign panel shall be at least 915 mm (3') above the parking area surface.
9. Curb and sidewalk ramps shall conform to the details shown on Standard Plan A88
10. Accessible on-street parking spaces shall not be smaller in length or width than that specified by the local jurisdiction for other spaces.
11. Blue paint, instead of white may be used for marking accessibility aisles in areas where snow may cause white markings to not be visible.
12. Design details approved by the Division of the State Architect on March 18, 1996.



ISA PARKING SIGN (R99)
Standard 300 mm x 450 mm
(12" x 18"), See Note 8



VAN ACCESSIBLE SIGN (R99A)
Standard 300 mm x 200 mm
(12" x 8"), See Notes 2 and 8

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ACCESSIBLE PARKING

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NO SCALE

A90

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

H. David Cordova
REGISTERED CIVIL ENGINEER

July 1, 2002
PLANS APPROVAL DATE

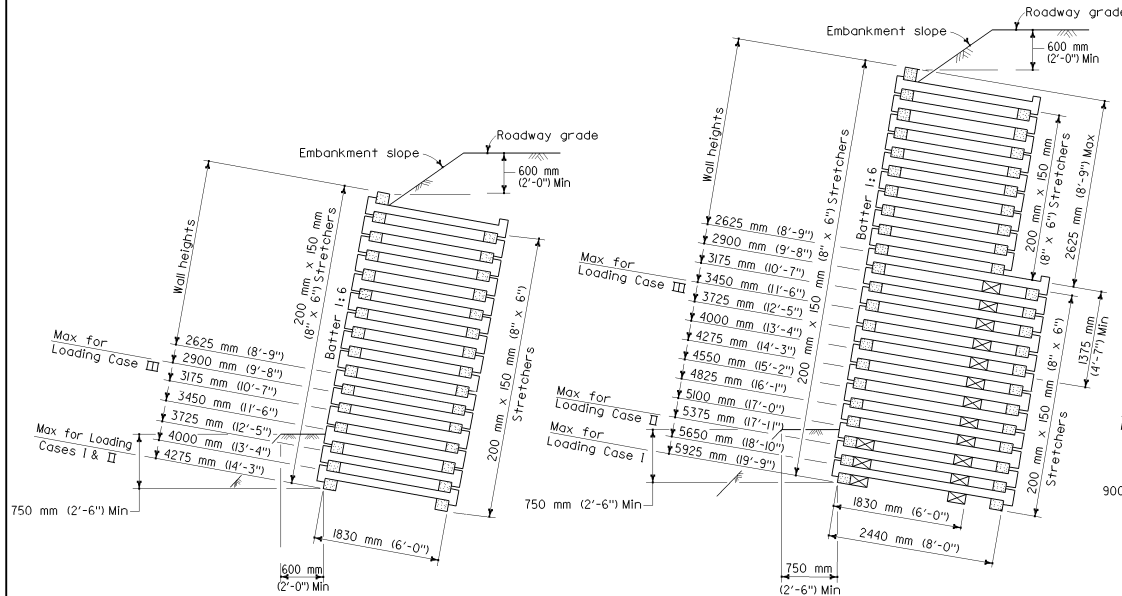
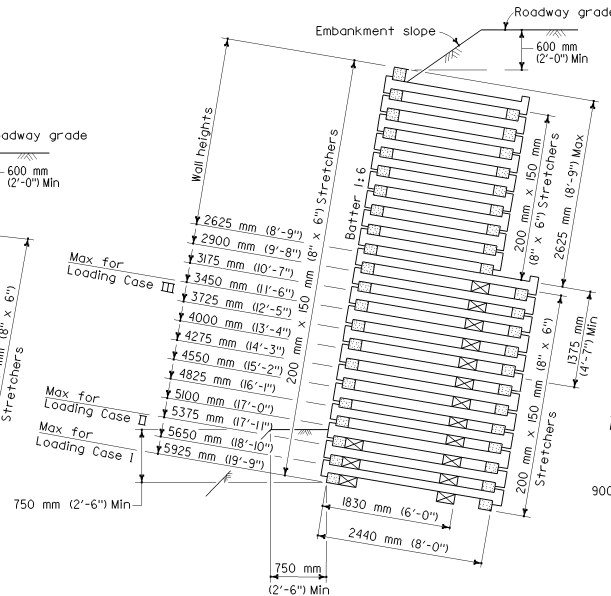
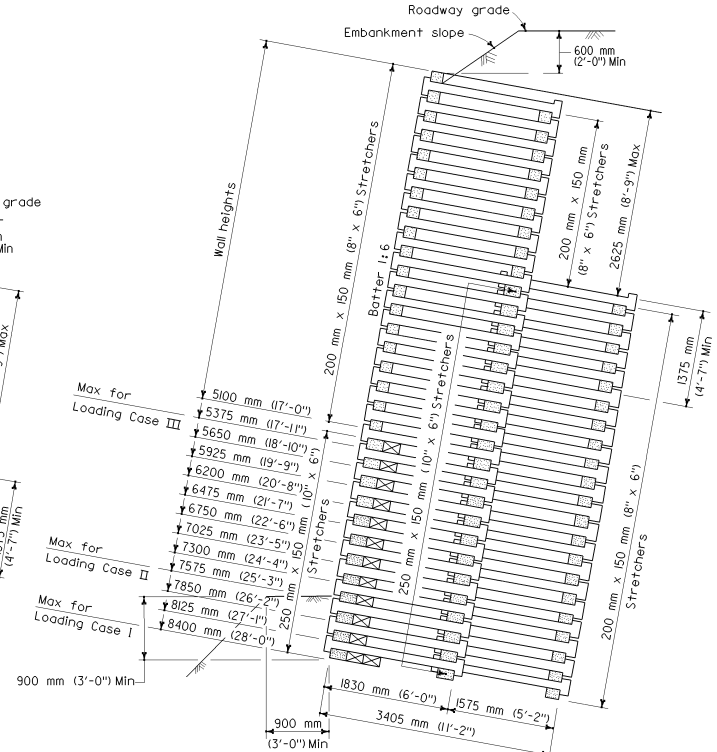
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LEGEND

- ☒ = 250 mm x 150 mm x 250 mm
(10" x 6" x 10")
Filler block placed under header

**TYPE A****TYPE B****TYPE C**

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**REINFORCED CONCRETE CRIB WALL
BATTERED WALL -
TYPES A, B AND C**

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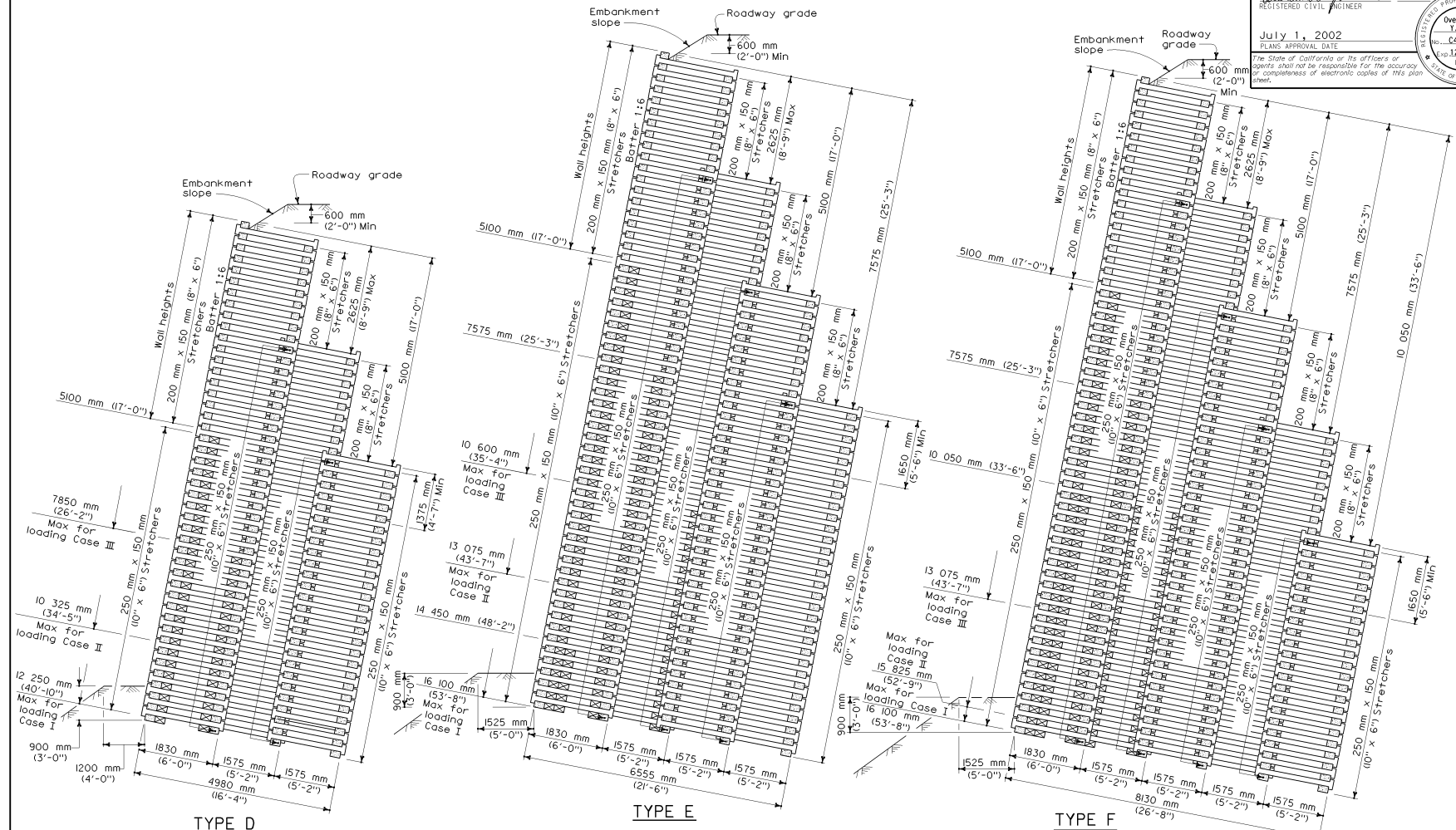
C7A

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
<p><i>Overcomer & Son</i> REGISTERED CIVIL ENGINEER</p> <p>July 1, 2002 PLANS APPROVAL DATE</p> <p>The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.</p> <p>Caltrans now has a web site! To get to the web site, go to: https://www.dot.ca.gov</p>					

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(11)
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2002 DUAL UNITS STD PLAN C7B



LEGEND


☒ = 250 mm x 150 mm x 250 mm
(10" x 6" x 10")
Filler block placed under header

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**REINFORCED CONCRETE CRIB WALL
BATTERED WALL -
TYPES D, E AND F**

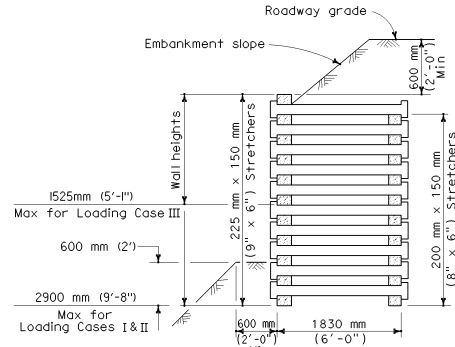
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NO SCALE

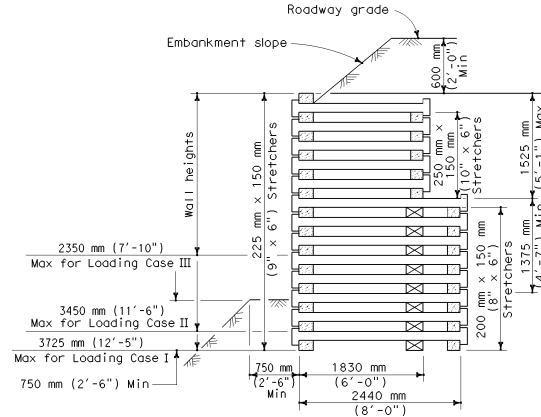
C7B

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
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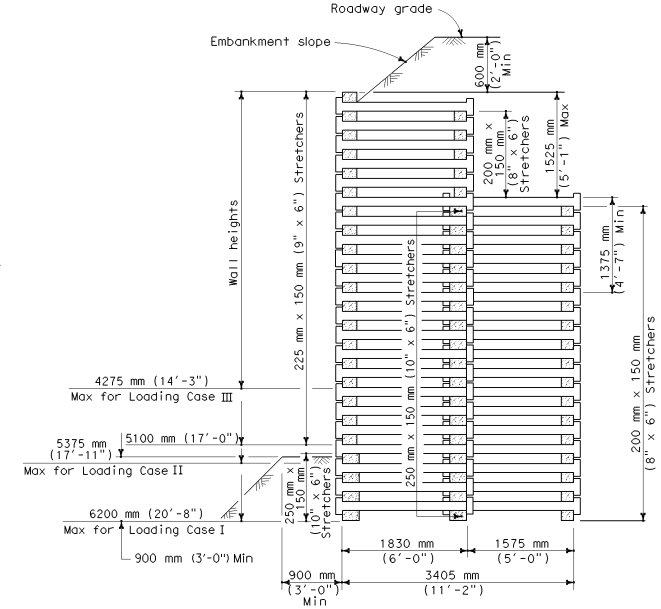
REGISTERED PROFESSIONAL ENGINEER
 Overcomer, Y. Ror
 No. C45803
 Exp. 12-31-02
 STATE OF CALIFORNIA



TYPE A




TYPE B



TYPE C

LEGEND

 = 250 mm (10") x 150 mm (6") x 250 mm (10") x 10"
 Filler block placed under header

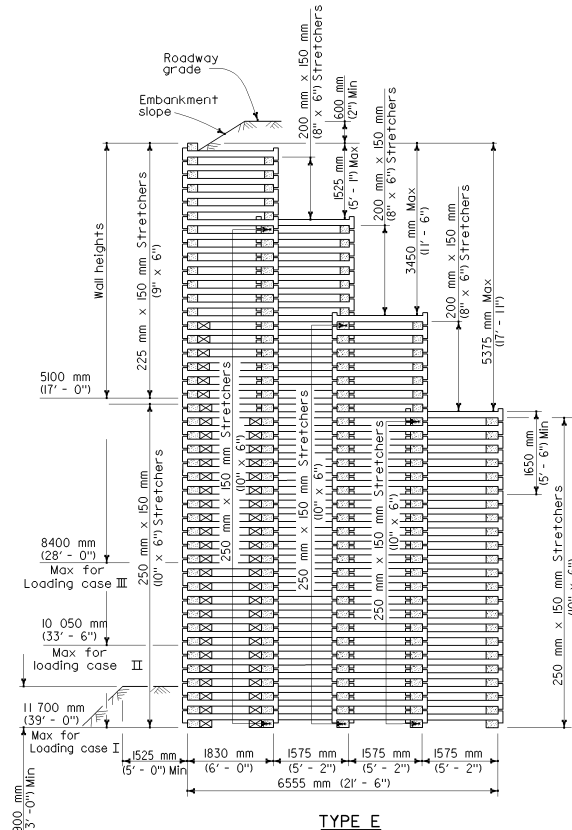
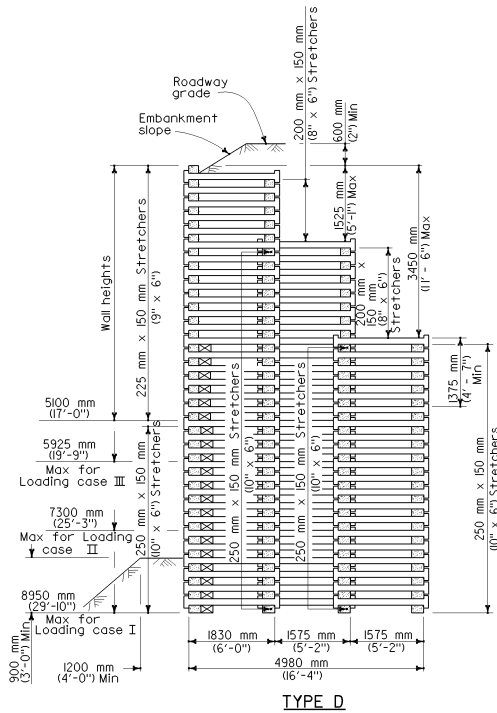
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REINFORCED CONCRETE CRIB WALL VERTICAL WALL - TYPES A, B AND C

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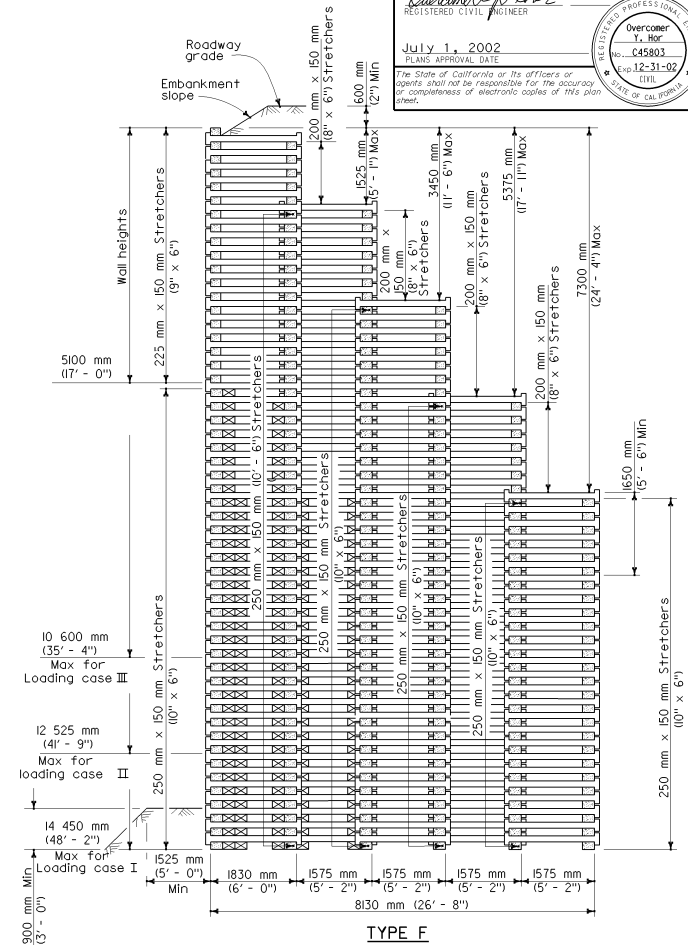
NO SCALE

C7C



LEGEND

- ☐ = 250 mm x 150 mm x 250 mm (10" x 6" x 10")
 Filler block placed under header



REINFORCED CONCRETE CRIB WALL VERTICAL WALL - TYPES D, E AND F

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NO SCALE

C7D

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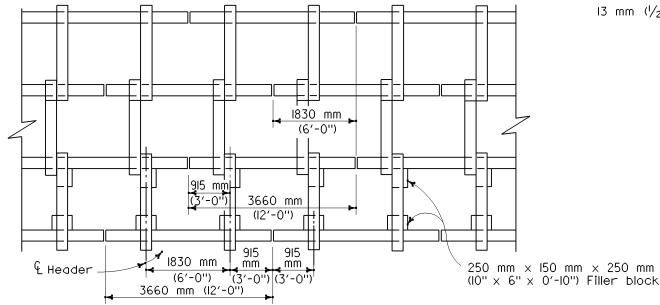
DIST COUNTY ROUTE KILOMETER POST SHEET TOTAL
 TOTAL PROJECT NO. SHEETS

Overcomer, Y. Mor
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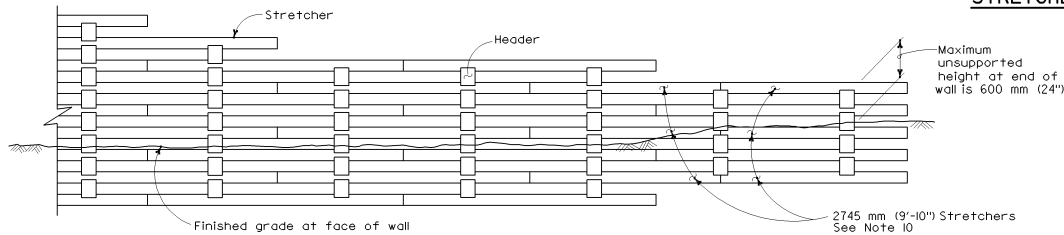
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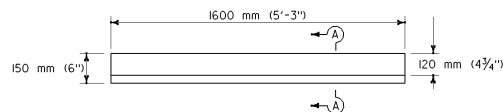




PARTIAL PLAN AT BASE
TYPE "D" SHOWN, OTHERS SIMILAR

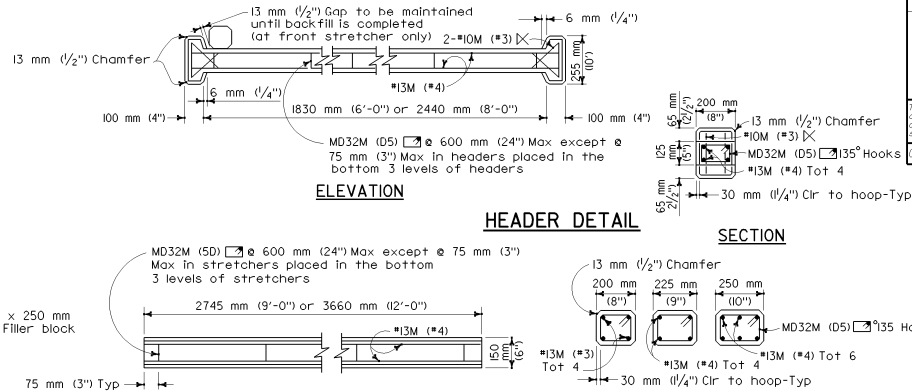


PARTIAL ELEVATION



ELEVATION

FRONT FACE CLOSURE MEMBER



ELEVATION

STRETCHER DETAIL

SECTION

GENERAL NOTES

- Reinforced Concrete:
Concrete - $f'_c = 25 \text{ MPa}$ (3250 psi)
Bar Reinforcement - $f_y = 420 \text{ MPa}$ (60,000 psi)
Deformed Wire - $f_y = 450 \text{ MPa}$ (65,000 psi)
- Soil Parameters:
Backfill - $\phi = 34^\circ$
 $\delta = 22.7^\circ$
 $\delta = 19 \text{ kN/m}^3$ (120 pcf)
Foundation - $\phi = 34^\circ$
Lateral earth pressure determined by Coulomb's theory.
- Concrete to concrete bearing surfaces shall be finished to a smooth plane. The gap between bearing surfaces shall not exceed 3.0 mm (1/8"). Where a gap of 1.5 mm to 3.0 mm (1/16" to 1/8") exists, a 1.5 mm (1/16") pad of asphalt felt or sheet neoprene shall be placed between the bearing surfaces. For wall Types D, E, and F, a 1.5 mm (1/16") asphalt felt pad or sheet neoprene shall be placed between all concrete bearing surfaces below the 8950 mm (29'-10") level.
- All members may be manufactured to dimensions 4 mm (1/8") greater in thickness and stretchers 13 mm (1/2") less in length.
- Where an opening is specified in the face of a wall, special length stretchers and additional headers may be required.
- For non-tangent wall alignment, special length stretchers may be required.
- For non-tangent wall alignment and at locations where filler blocks are required, special length front face closure members may be required.
- The thickness of the lowest step for each wall type shall not be less than the dimension shown on these plans.
- Use of "Front Face Closure Member" shall be required only when specified on project plans or in the Special Provisions.
- All stretchers are 3660 mm (12'-0") except as noted.

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REINFORCED CONCRETE CRIB WALL TYPES A, B, C, D, E AND F HEADER AND STRETCHER DETAILS

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NO SCALE

C7E

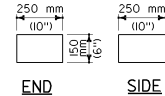
DIST	COUNTY	ROUTE	KILOMETER TOTAL PROJECT	POST NO.	SHEET NO.	TOTAL SHEETS

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REGISTERED CIVIL ENGINEER
No. C45803
Exp. 12-31-02
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FILLER BLOCK DETAIL

DESIGN EXAMPLES

Example No.1

Given: Wall height 6100 mm (20')

1:2 (2:1) cut slope to be retained. Foundation site Investigation indicates lateral pressure from material above will be equivalent to Design Loading Case II condition and an allowable soil bearing capacity of 240 kPa (5 Kips/SOFT).

Select: Battered Type C or Type D wall. Actual H=6200 mm (20'-8") Type D vertical wall can be used by increasing the allowable bearing capacity of the original ground.

Example No.2

Given: Wall height 2750 mm (9')

Design Loading Case I; 600 mm (2') level ground surcharge plus 11.5 kPa (0.25 Kips/SOFT) of surcharge to be retained. Base founded in embankment.

Select: Battered or vertical Type A or Type B wall. Actual H=2900 mm (9'-8").

Example No.3

Given: Wall height 3050 mm (10')

Design Loading Case III; 1:1.5 (1 1/2:1) embankment slope to be retained. Base in original ground, sloping away from toe of wall at 1:2 (2:1). Foundation investigation determined the allowable soil bearing capacity is 190 kPa (4 Kips/SOFT), considering the sloping ground in front of wall.

Select: Battered Type B or Type C wall or Vertical Type C wall. Actual H=3175 mm (10'-5").

Example No.4

Given: Wall height 9150 mm (30')

Design Loading Case II; 1:2 (2:1) embankment slope to be retained. Base in embankment 1525 mm (5') depth minimum.

Select: Battered Type D, Type E or Type F wall or Vertical Type F wall. Actual H=9375 (30'-9"). For all types the foundation pressure is between 240 and 385 kPa (5.0 and 8.0 Kips/SOFT). Embankment material below the wall must be "Structure Backfill". See Design Example Footnote 1.

FOUNDATION PRESSURE - BATTERED WALL

TYPE	LOADING CASE	WALL HEIGHT															
		425 mm (1'-5")	700 mm (2'-4")	975 mm (3'-3")	1250 mm (4'-2")	1525 mm (5'-1")	1800 mm (6'-0")	2075 mm (6'-10")	2350 mm (7'-10")	2625 mm (8'-9")	2900 mm (9'-8")	3175 mm (10'-7")	3450 mm (11'-6")	3725 mm (12'-5")	4000 mm (13'-4")	4275 mm (14'-3")	4550 mm (15'-2")
A	I	35 kPa* (0.73-kips/SOFT*)	40 kPa* (0.89-kips/SOFT*)	50 kPa* (1.02-kips/SOFT*)	55 kPa* (1.16-kips/SOFT*)	60 kPa* (1.28-kips/SOFT*)	65 kPa* (1.37-kips/SOFT*)	70 kPa* (1.45-kips/SOFT*)	70 kPa* (1.49-kips/SOFT*)	75 kPa* (1.57-kips/SOFT*)	75 kPa* (1.57-kips/SOFT*)	80 kPa* (1.68-kips/SOFT*)	90 kPa* (2.25-kips/SOFT*)	100 kPa* (2.67-kips/SOFT*)	100 kPa* (2.67-kips/SOFT*)	100 kPa* (2.67-kips/SOFT*)	100 kPa* (2.67-kips/SOFT*)
	II	40 kPa* (0.81-kips/SOFT*)	45 kPa* (0.95-kips/SOFT*)	50 kPa* (1.09-kips/SOFT*)	55 kPa* (1.22-kips/SOFT*)	60 kPa* (1.34-kips/SOFT*)	65 kPa* (1.43-kips/SOFT*)	70 kPa* (1.51-kips/SOFT*)	75 kPa* (1.56-kips/SOFT*)	75 kPa* (1.59-kips/SOFT*)	85 kPa* (1.58-kips/SOFT*)	85 kPa* (1.78-kips/SOFT*)	100 kPa* (2.13-kips/SOFT*)	120 kPa* (2.52-kips/SOFT*)	140 kPa* (2.96-kips/SOFT*)	165 kPa* (3.46-kips/SOFT*)	165 kPa* (3.46-kips/SOFT*)
	III	45 kPa* (0.94-kips/SOFT*)	50 kPa* (1.02-kips/SOFT*)	50 kPa* (1.08-kips/SOFT*)	55 kPa* (1.11-kips/SOFT*)	55 kPa* (1.10-kips/SOFT*)	65 kPa* (1.33-kips/SOFT*)	80 kPa* (1.70-kips/SOFT*)	100 kPa* (2.13-kips/SOFT*)	125 kPa* (2.64-kips/SOFT*)	155 kPa* (3.22-kips/SOFT*)	155 kPa* (3.22-kips/SOFT*)					
B	I									65 kPa* (1.34-kips/SOFT*)	70 kPa* (1.50-kips/SOFT*)	80 kPa* (1.69-kips/SOFT*)	90 kPa* (1.88-kips/SOFT*)	105 kPa* (2.14-kips/SOFT*)	120 kPa* (2.45-kips/SOFT*)	130 kPa* (2.73-kips/SOFT*)	145 kPa* (3.05-kips/SOFT*)
	II									65 kPa* (1.40-kips/SOFT*)	80 kPa* (1.64-kips/SOFT*)	90 kPa* (1.90-kips/SOFT*)	105 kPa* (2.18-kips/SOFT*)	120 kPa* (2.49-kips/SOFT*)	135 kPa* (2.83-kips/SOFT*)	155 kPa* (3.18-kips/SOFT*)	170 kPa* (3.57-kips/SOFT*)
	III									105 kPa* (2.16-kips/SOFT*)	125 kPa* (2.68-kips/SOFT*)	150 kPa* (3.10-kips/SOFT*)	175 kPa* (3.64-kips/SOFT*)				
C	I									75 kPa* (1.59-kips/SOFT*)	85 kPa* (1.75-kips/SOFT*)	95 kPa* (1.75-kips/SOFT*)	105 kPa* (1.95-kips/SOFT*)	120 kPa* (2.15-kips/SOFT*)	140 kPa* (2.33-kips/SOFT*)	160 kPa* (2.52-kips/SOFT*)	180 kPa* (2.52-kips/SOFT*)
	II									90 kPa* (1.83-kips/SOFT*)	85 kPa* (1.81-kips/SOFT*)	100 kPa* (2.07-kips/SOFT*)	110 kPa* (2.35-kips/SOFT*)	125 kPa* (2.59-kips/SOFT*)	145 kPa* (2.85-kips/SOFT*)	165 kPa* (2.85-kips/SOFT*)	185 kPa* (2.85-kips/SOFT*)
	III									110 kPa* (2.26-kips/SOFT*)	120 kPa* (2.49-kips/SOFT*)	140 kPa* (2.92-kips/SOFT*)	160 kPa* (3.38-kips/SOFT*)	185 kPa* (3.83-kips/SOFT*)	205 kPa* (4.32-kips/SOFT*)	205 kPa* (4.32-kips/SOFT*)	205 kPa* (4.32-kips/SOFT*)
D	I																105 kPa* (2.16-kips/SOFT*)
	II																125 kPa* (2.65-kips/SOFT*)
	III																180 kPa* (3.76-kips/SOFT*)
E	I																
	II																
	III																
F	I																
	II																
	III																

*Indicates pressure at heel

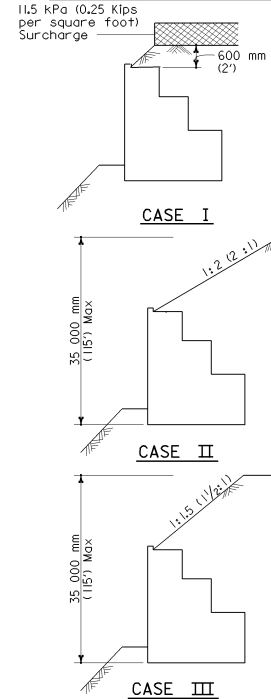
■ Heavy vertical line indicates maximum allowable wall height for particular wall type and particular loading case.

DESIGN EXAMPLE FOOTNOTES

1. To constitute a "wall base in embankment" condition, a minimum of 1525 mm (5') of embankment at 95% relative compaction is required below the base of the wall. When the foundation pressure is between 240 and 385 kPa (5.0 and 8.0 Kips/SOFT), the embankment below the wall shall be constructed with structure backfill material to the limits specified for embankments constructed with relative compaction of 95%. The maximum allowable soil bearing capacity is 385 kPa (8 Kips/SOFT).

2. For walls with "wall base in original ground" condition, the allowable soil bearing capacity, design lateral loads, and slope stability shall be determined by a foundation site investigation and by an analysis. Walls shall not be founded in original ground having an allowable soil bearing capacity of less than 145 kPa (3 Kips/SOFT).

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
<p>Overcomer, Y. Ror</p> <p>REGISTERED CIVIL ENGINEER</p> <p>July 1, 2002</p> <p>PLANS APPROVAL DATE</p> <p>The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.</p> <p>Caltrans now has a web site! To get to the web site, go to: http://www.dot.ca.gov</p>					



DETAIL OF DESIGN LOADING CASES

DESIGN DATA FOR REINFORCED CONCRETE CRIB WALL FOUNDATION PRESSURE - BATTERED WALL

These "Standard Plans for Construction of Local Streets and Roads" contain units in two systems of measurement: International System of Units (SI or "metric") and United States Standard Measures shown in the parentheses (). The measurements expressed in the two systems are not necessarily equal or interchangeable. See the "Foreword" at the beginning of this publication.

NO SCALE

C7F

DIST.	COUNTY	ROUTE	KILOMETER TOTAL PROJECT	POST NO.	SHEET NO.	TOTAL SHEETS
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FOUNDATION PRESSURE - BATTERED WALL

TYPE	LOADING CASE	4825 mm (16'-1")	5100 mm (17'-0")	5375 mm (17'-11")	5650 mm (18'-10")	5925 mm (19'-9")	6200 mm (20'-8")	6475 mm (21'-7")	6750 mm (22'-6")	7025 mm (23'-5")	7300 mm (24'-4")	7575 mm (25'-3")	7850 mm (26'-2")	8125 mm (27'-1")	8400 mm (28'-0")	8675 mm (28'-11")	8950 mm (29'-10")	9225 mm (30'-9")	9500 mm (31'-8")	9775 mm (32'-7")	10050 mm (33'-6")	10325 mm (34'-5")
A	I																					
	II																					
	III																					
B	I	165 kPa (3.40-kips/soft)	180 kPa (3.79-kips/soft)	205 kPa (4.23-kips/soft)	225 kPa (4.69-kips/soft)	250 kPa (5.21-kips/soft)																
	II	190 kPa (3.99-kips/soft)	215 kPa (4.46-kips/soft)	240 kPa (4.96-kips/soft)																		
	III																					
C	I	130 kPa (2.73-kips/soft)	140 kPa (2.96-kips/soft)	155 kPa (3.20-kips/soft)	165 kPa (3.46-kips/soft)	180 kPa (3.74-kips/soft)	195 kPa (4.04-kips/soft)	210 kPa (4.36-kips/soft)	225 kPa (4.71-kips/soft)	245 kPa (5.08-kips/soft)	265 kPa (5.48-kips/soft)	285 kPa (5.90-kips/soft)	305 kPa (6.35-kips/soft)	325 kPa (6.83-kips/soft)	350 kPa (7.34-kips/soft)							
	II	150 kPa (3.13-kips/soft)	165 kPa (3.43-kips/soft)	180 kPa (3.75-kips/soft)	195 kPa (4.08-kips/soft)	215 kPa (4.44-kips/soft)	230 kPa (4.83-kips/soft)	250 kPa (5.24-kips/soft)	270 kPa (5.67-kips/soft)	295 kPa (6.14-kips/soft)	320 kPa (6.63-kips/soft)	345 kPa (7.15-kips/soft)										
	III	230 kPa (4.83-kips/soft)	260 kPa (5.40-kips/soft)	290 kPa (6.00-kips/soft)																		
D	I	115 kPa (2.35-kips/soft)	120 kPa (2.54-kips/soft)	130 kPa (2.73-kips/soft)	140 kPa (2.94-kips/soft)	150 kPa (3.15-kips/soft)	160 kPa (3.36-kips/soft)	170 kPa (3.59-kips/soft)	180 kPa (3.78-kips/soft)	190 kPa (3.98-kips/soft)	200 kPa (4.18-kips/soft)	210 kPa (4.40-kips/soft)	220 kPa (4.63-kips/soft)	235 kPa (4.87-kips/soft)	245 kPa (5.13-kips/soft)	260 kPa (5.40-kips/soft)	270 kPa (5.67-kips/soft)	285 kPa (5.97-kips/soft)	300 kPa (6.28-kips/soft)	315 kPa (6.60-kips/soft)	330 kPa (6.93-kips/soft)	350 kPa (7.29-kips/soft)
	II	120 kPa* (2.55-kips/soft)	130 kPa (2.69-kips/soft)	140 kPa (2.96-kips/soft)	155 kPa (3.24-kips/soft)	170 kPa (3.53-kips/soft)	185 kPa (3.83-kips/soft)	200 kPa (4.14-kips/soft)	210 kPa (4.43-kips/soft)	225 kPa (4.73-kips/soft)	240 kPa (5.04-kips/soft)	255 kPa (5.37-kips/soft)	275 kPa (5.71-kips/soft)	290 kPa (6.06-kips/soft)	310 kPa (6.43-kips/soft)	325 kPa (6.81-kips/soft)	345 kPa (7.21-kips/soft)	365 kPa (7.63-kips/soft)	385 kPa (8.07-kips/soft)	410 kPa (8.51-kips/soft)	430 kPa (8.99-kips/soft)	455 kPa (9.48-kips/soft)
	III	165 kPa* (3.48-kips/soft)	170 kPa (3.54-kips/soft)	190 kPa (3.96-kips/soft)	210 kPa (4.40-kips/soft)	235 kPa (4.86-kips/soft)	255 kPa (5.34-kips/soft)	280 kPa (5.84-kips/soft)	305 kPa (6.35-kips/soft)	330 kPa (6.87-kips/soft)	355 kPa (7.42-kips/soft)	385 kPa (8.01-kips/soft)	415 kPa (8.62-kips/soft)									
E	I						140 kPa (2.87-kips/soft)	145 kPa (3.05-kips/soft)	155 kPa (3.24-kips/soft)	165 kPa (3.43-kips/soft)	175 kPa (3.63-kips/soft)	185 kPa (3.84-kips/soft)	195 kPa (4.04-kips/soft)	205 kPa (4.26-kips/soft)	215 kPa (4.48-kips/soft)	225 kPa (4.71-kips/soft)	235 kPa (4.95-kips/soft)	250 kPa (5.19-kips/soft)	260 kPa (5.39-kips/soft)	270 kPa (5.60-kips/soft)	280 kPa (5.82-kips/soft)	290 kPa (6.04-kips/soft)
	II						170 kPa* (3.53-kips/soft)	165 kPa* (3.42-kips/soft)	170 kPa (3.51-kips/soft)	180 kPa (3.77-kips/soft)	195 kPa (4.05-kips/soft)	210 kPa (4.34-kips/soft)	220 kPa (4.63-kips/soft)	235 kPa (4.94-kips/soft)	250 kPa (5.26-kips/soft)	270 kPa (5.58-kips/soft)	285 kPa (5.92-kips/soft)	300 kPa (6.27-kips/soft)	315 kPa (6.59-kips/soft)	330 kPa (6.92-kips/soft)	350 kPa (7.26-kips/soft)	365 kPa (7.61-kips/soft)
	III						250 kPa* (5.19-kips/soft)	235 kPa* (4.89-kips/soft)	220 kPa* (4.61-kips/soft)	240 kPa (4.98-kips/soft)	260 kPa (5.41-kips/soft)	280 kPa (5.89-kips/soft)	300 kPa (6.31-kips/soft)	325 kPa (6.78-kips/soft)	350 kPa (7.28-kips/soft)	375 kPa (7.79-kips/soft)	400 kPa (8.32-kips/soft)	425 kPa (8.87-kips/soft)	450 kPa (9.43-kips/soft)	480 kPa (9.99-kips/soft)	505 kPa (10.59-kips/soft)	535 kPa (11.21-kips/soft)
F	I													180 kPa (3.79-kips/soft)	190 kPa (4.17-kips/soft)	200 kPa (4.36-kips/soft)	210 kPa (4.56-kips/soft)	220 kPa (4.76-kips/soft)	230 kPa (4.91-kips/soft)	240 kPa (5.19-kips/soft)	250 kPa (5.41-kips/soft)	260 kPa (5.60-kips/soft)
	II													200 kPa* (4.14-kips/soft)	210 kPa (4.38-kips/soft)	225 kPa (4.92-kips/soft)	235 kPa (5.20-kips/soft)	250 kPa (5.49-kips/soft)	265 kPa (5.79-kips/soft)	280 kPa (6.09-kips/soft)	290 kPa (6.30-kips/soft)	305 kPa (6.40-kips/soft)
	III													290 kPa* (6.09-kips/soft)	280 kPa* (5.81-kips/soft)	290 kPa (6.06-kips/soft)	310 kPa (6.48-kips/soft)	330 kPa (6.91-kips/soft)	350 kPa (7.35-kips/soft)	375 kPa (7.80-kips/soft)	395 kPa (8.27-kips/soft)	420 kPa (8.76-kips/soft)

*Indicates pressure at heel


■ Heavy vertical line indicates maximum allowable wall height for particular wall type and particular loading case.

DESIGN DATA FOR REINFORCED CONCRETE CRIB WALL FOUNDATION PRESSURE - BATTERED WALL

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NO SCALE

C7FA

DIST.	COUNTY	ROUTE	KILOMETER TOTAL	POST PROJECT	SHEET NO.	TOTAL SHEETS
						
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FOUNDATION PRESSURE - BATTERED WALL

TYPE	LOADING CASE	WALL HEIGHT																				
		10600 mm (35'-4")	10875 mm (36'-3")	11150 mm (37'-2")	11425 mm (38'-1")	11700 mm (39'-0")	11975 mm (39'-1")	12250 mm (40'-10")	12525 mm (41'-9")	12800 mm (42'-8")	13075 mm (43'-7")	13350 mm (44'-6")	13625 mm (45'-5")	13900 mm (46'-4")	14175 mm (47'-3")	14450 mm (48'-2")	14725 mm (49'-1")	15000 mm (50'-0")	15275 mm (50'-1")	15550 mm (51'-10")	15825 mm (52'-9")	16100 mm (53'-8")
A	I																					
	II																					
	III																					
B	I																					
	II																					
	III																					
C	I																					
	II																					
	III																					
D	I	365 kPa (7.65-kips/ SOFT)	385 kPa (8.04-kips/ SOFT)	405 kPa (8.45-kips/ SOFT)	425 kPa (8.87-kips/ SOFT)	445 kPa (9.31-kips/ SOFT)	470 kPa (9.77-kips/ SOFT)	490 kPa (10.25-kips/ SOFT)														
	II																					
	III																					
E	I	300 kPa (6.28-kips/ SOFT)	315 kPa (6.52-kips/ SOFT)	325 kPa (6.77-kips/ SOFT)	340 kPa (7.03-kips/ SOFT)	350 kPa (7.30-kips/ SOFT)	365 kPa (7.58-kips/ SOFT)	375 kPa (7.87-kips/ SOFT)	390 kPa (8.17-kips/ SOFT)	405 kPa (8.48-kips/ SOFT)	420 kPa (8.80-kips/ SOFT)	440 kPa (9.13-kips/ SOFT)	455 kPa (9.48-kips/ SOFT)	470 kPa (9.84-kips/ SOFT)	490 kPa (10.21-kips/ SOFT)	505 kPa (10.59-kips/ SOFT)	525 kPa (10.98-kips/ SOFT)	545 kPa (11.39-kips/ SOFT)	565 kPa (11.82-kips/ SOFT)	585 kPa (12.25-kips/ SOFT)	610 kPa (12.70-kips/ SOFT)	630 kPa (13.17-kips/ SOFT)
	II	380 kPa (7.97-kips/ SOFT)	400 kPa (8.35-kips/ SOFT)	420 kPa (8.73-kips/ SOFT)	435 kPa (9.13-kips/ SOFT)	455 kPa (9.54-kips/ SOFT)	475 kPa (9.96-kips/ SOFT)	500 kPa (10.39-kips/ SOFT)	520 kPa (10.84-kips/ SOFT)	540 kPa (11.31-kips/ SOFT)	565 kPa (11.78-kips/ SOFT)											
	III	565 kPa (11.84-kips/ SOFT)																				
F	I	270 kPa (5.63-kips/ SOFT)	280 kPa (5.86-kips/ SOFT)	290 kPa (6.10-kips/ SOFT)	305 kPa (6.33-kips/ SOFT)	315 kPa (6.58-kips/ SOFT)	325 kPa (6.79-kips/ SOFT)	335 kPa (7.00-kips/ SOFT)	345 kPa (7.21-kips/ SOFT)	355 kPa (7.44-kips/ SOFT)	365 kPa (7.66-kips/ SOFT)	380 kPa (7.90-kips/ SOFT)	390 kPa (8.14-kips/ SOFT)	400 kPa (8.39-kips/ SOFT)	415 kPa (8.65-kips/ SOFT)	425 kPa (8.92-kips/ SOFT)	440 kPa (9.19-kips/ SOFT)	455 kPa (9.47-kips/ SOFT)	470 kPa (9.76-kips/ SOFT)	480 kPa (10.05-kips/ SOFT)	495 kPa (10.36-kips/ SOFT)	510 kPa (10.67-kips/ SOFT)
	II	320 kPa (6.72-kips/ SOFT)	340 kPa (7.06-kips/ SOFT)	355 kPa (7.40-kips/ SOFT)	370 kPa (7.74-kips/ SOFT)	390 kPa (8.10-kips/ SOFT)	405 kPa (8.44-kips/ SOFT)	420 kPa (8.78-kips/ SOFT)	435 kPa (9.13-kips/ SOFT)	455 kPa (9.49-kips/ SOFT)	470 kPa (9.85-kips/ SOFT)	490 kPa (10.23-kips/ SOFT)	510 kPa (10.62-kips/ SOFT)	525 kPa (11.01-kips/ SOFT)	545 kPa (11.42-kips/ SOFT)	565 kPa (11.84-kips/ SOFT)	585 kPa (12.26-kips/ SOFT)	610 kPa (12.70-kips/ SOFT)	630 kPa (13.15-kips/ SOFT)	650 kPa (13.60-kips/ SOFT)	675 kPa (14.07-kips/ SOFT)	
	III	445 kPa (9.25-kips/ SOFT)	470 kPa (9.77-kips/ SOFT)	495 kPa (10.30-kips/ SOFT)	520 kPa (10.84-kips/ SOFT)	545 kPa (11.41-kips/ SOFT)	575 kPa (11.98-kips/ SOFT)	600 kPa (12.55-kips/ SOFT)	630 kPa (13.16-kips/ SOFT)	660 kPa (13.78-kips/ SOFT)	690 kPa (14.41-kips/ SOFT)											

*Indicates pressure at heel

■ Heavy vertical line indicates maximum allowable wall height for particular wall type and particular loading case.

DESIGN DATA FOR REINFORCED CONCRETE CRIB WALL FOUNDATION PRESSURE - BATTERED WALL

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NO SCALE


C7FB

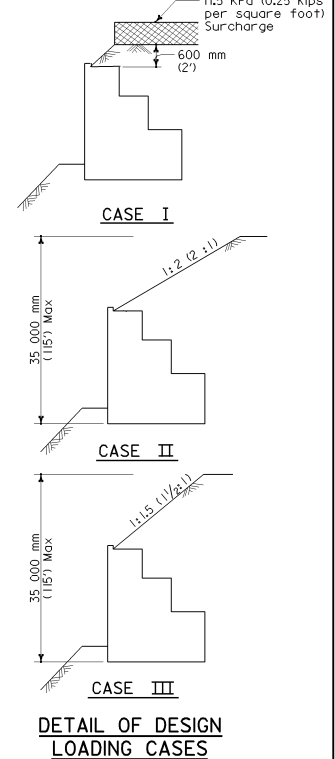
FOUNDATION PRESSURE - VERTICAL WALL

TYPE	LOADING CASE	WALL HEIGHT															
		425 mm (1'-5")	700 mm (2'-4")	975 mm (3'-3")	1250 mm (4'-2")	1525 mm (5'-1")	1800 mm (6'-0")	2075 mm (6'-11")	2350 mm (7'-10")	2625 mm (8'-9")	2900 mm (9'-8")	3175 mm (10'-7")	3450 mm (11'-6")	3725 mm (12'-5")	4000 mm (13'-4")	4275 mm (14'-3")	4550 mm (15'-2")
A	I	25 kPa* (0.49-kips/ SQFT*)	30 kPa* (0.58-kips/ SQFT*)	30 kPa* (0.64-kips/ SQFT*)	40 kPa (0.82-kips/ SQFT)	50 kPa (1.07-kips/ SQFT)	65 kPa (1.35-kips/ SQFT)	80 kPa (1.68-kips/ SQFT)	100 kPa (2.06-kips/ SQFT)	120 kPa (2.48-kips/ SQFT)	145 kPa (2.97-kips/ SQFT)						
	II	25 kPa* (0.54-kips/ SQFT*)	30 kPa* (0.63-kips/ SQFT*)	35 kPa* (0.69-kips/ SQFT*)	40 kPa (0.80-kips/ SQFT)	50 kPa (1.06-kips/ SQFT)	65 kPa (1.37-kips/ SQFT)	85 kPa (1.73-kips/ SQFT)	105 kPa (2.15-kips/ SQFT)	125 kPa (2.63-kips/ SQFT)	155 kPa (3.18-kips/ SQFT)						
	III	30 kPa* (0.63-kips/ SQFT*)	30 kPa* (0.66-kips/ SQFT*)	40 kPa (0.88-kips/ SQFT)	60 kPa (1.25-kips/ SQFT)	80 kPa (1.68-kips/ SQFT)											
B	I						55 kPa (1.16-kips/ SQFT)	70 kPa (1.48-kips/ SQFT)	85 kPa (1.79-kips/ SQFT)	100 kPa (2.11-kips/ SQFT)	120 kPa (2.45-kips/ SQFT)	135 kPa (2.82-kips/ SQFT)	155 kPa (3.22-kips/ SQFT)	175 kPa (3.65-kips/ SQFT)			
	II						60 kPa* (1.26-kips/ SQFT*)	70 kPa (1.45-kips/ SQFT)	90 kPa (1.83-kips/ SQFT)	105 kPa (2.23-kips/ SQFT)	125 kPa (2.65-kips/ SQFT)	150 kPa (3.09-kips/ SQFT)	170 kPa (3.59-kips/ SQFT)				
	III						105 kPa* (2.15-kips/ SQFT*)	100 kPa (2.06-kips/ SQFT)	130 kPa (2.66-kips/ SQFT)								
C	I									80 kPa (1.67-kips/ SQFT)	95 kPa (1.95-kips/ SQFT)	105 kPa (2.19-kips/ SQFT)	115 kPa (2.44-kips/ SQFT)	130 kPa (2.71-kips/ SQFT)	145 kPa (3.01-kips/ SQFT)	160 kPa (3.32-kips/ SQFT)	175 kPa (3.66-kips/ SQFT)
	II									85 kPa* (1.72-kips/ SQFT*)	95 kPa (1.95-kips/ SQFT)	110 kPa (2.25-kips/ SQFT)	125 kPa (2.58-kips/ SQFT)	140 kPa (2.93-kips/ SQFT)	160 kPa (3.31-kips/ SQFT)	180 kPa (3.73-kips/ SQFT)	200 kPa (4.17-kips/ SQFT)
	III									140 kPa* (2.96-kips/ SQFT*)	130 kPa (2.67-kips/ SQFT)	150 kPa (3.17-kips/ SQFT)	180 kPa (3.71-kips/ SQFT)	205 kPa (4.30-kips/ SQFT)	235 kPa (4.95-kips/ SQFT)	270 kPa (5.65-kips/ SQFT)	
D	I															130 kPa (2.72-kips/ SQFT)	145 kPa (2.99-kips/ SQFT)
	II															135 kPa (2.83-kips/ SQFT)	155 kPa (3.32-kips/ SQFT)
	III															190 kPa* (3.97-kips/ SQFT*)	210 kPa (4.42-kips/ SQFT)
E	I																
	II																
	III																
F	I																
	II																
	III																

*Indicates pressure at heel

■ Heavy vertical line indicates maximum allowable wall height for particular wall type and particular loading case.

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NO SCALE



C7G

FOUNDATION PRESSURE - VERTICAL WALL

TYPE	LOADING CASE	WALL HEIGHT																	
		4825 mm (16'-1")	5100 mm (17'-0")	5375 mm (17'-11")	5650 mm (18'-10")	5925 mm (19'-9")	6200 mm (20'-8")	6475 mm (21'-7")	6750 mm (22'-6")	7025 mm (23'-5")	7300 mm (24'-4")	7575 mm (25'-3")	7850 mm (26'-2")	8125 mm (27'-1")	8400 mm (28'-0")	8675 mm (28'-11")	8950 mm (29'-10")	9225 mm (30'-9")	9500 mm (31'-8")
A	I																		
	II																		
	III																		
B	I																		
	II																		
	III																		
C	I	195 kPa (4.02-kips/ SOFT)	210 kPa (4.41-kips/ SOFT)	230 kPa (4.82-kips/ SOFT)	250 kPa (5.26-kips/ SOFT)	275 kPa (5.73-kips/ SOFT)	300 kPa (6.22-kips/ SOFT)												
	II	225 kPa (4.66-kips/ SOFT)	250 kPa (5.18-kips/ SOFT)	275 kPa (5.73-kips/ SOFT)															
	III																		
D	I	155 kPa (3.26-kips/ SOFT)	170 kPa (3.50-kips/ SOFT)	180 kPa (3.76-kips/ SOFT)	195 kPa (4.03-kips/ SOFT)	205 kPa (4.32-kips/ SOFT)	220 kPa (4.62-kips/ SOFT)	235 kPa (4.92-kips/ SOFT)	250 kPa (5.25-kips/ SOFT)	270 kPa (5.59-kips/ SOFT)	285 kPa (5.95-kips/ SOFT)	305 kPa (6.32-kips/ SOFT)	320 kPa (6.71-kips/ SOFT)	340 kPa (7.12-kips/ SOFT)	360 kPa (7.55-kips/ SOFT)	385 kPa (7.99-kips/ SOFT)	405 kPa (8.45-kips/ SOFT)		
	II	175 kPa (3.65-kips/ SOFT)	190 kPa (3.95-kips/ SOFT)	210 kPa (4.35-kips/ SOFT)	225 kPa (4.73-kips/ SOFT)	245 kPa (5.14-kips/ SOFT)	265 kPa (5.56-kips/ SOFT)	290 kPa (6.01-kips/ SOFT)	310 kPa (6.48-kips/ SOFT)	335 kPa (6.97-kips/ SOFT)	360 kPa (7.49-kips/ SOFT)	385 kPa (8.03-kips/ SOFT)							
	III	240 kPa (5.04-kips/ SOFT)	270 kPa (5.60-kips/ SOFT)	295 kPa (5.60-kips/ SOFT)	325 kPa (6.20-kips/ SOFT)	360 kPa (6.82-kips/ SOFT)													
E	I			150 kPa (3.16-kips/ SOFT)	165 kPa (3.41-kips/ SOFT)	175 kPa (3.67-kips/ SOFT)	190 kPa (3.94-kips/ SOFT)	200 kPa (4.22-kips/ SOFT)	215 kPa (4.50-kips/ SOFT)	230 kPa (4.79-kips/ SOFT)	240 kPa (5.05-kips/ SOFT)	255 kPa (5.32-kips/ SOFT)	270 kPa (5.60-kips/ SOFT)	280 kPa (5.89-kips/ SOFT)	295 kPa (5.60-kips/ SOFT)	310 kPa (5.76-kips/ SOFT)	325 kPa (5.76-kips/ SOFT)	340 kPa (5.76-kips/ SOFT)	360 kPa (5.76-kips/ SOFT)
	II			165 kPa (3.42-kips/ SOFT)	180 kPa (3.70-kips/ SOFT)	190 kPa (4.01-kips/ SOFT)	210 kPa (4.38-kips/ SOFT)	230 kPa (4.79-kips/ SOFT)	250 kPa (5.20-kips/ SOFT)	270 kPa (5.63-kips/ SOFT)	290 kPa (5.63-kips/ SOFT)	305 kPa (6.40-kips/ SOFT)	325 kPa (6.81-kips/ SOFT)	345 kPa (7.24-kips/ SOFT)	370 kPa (7.68-kips/ SOFT)	390 kPa (7.68-kips/ SOFT)	415 kPa (8.62-kips/ SOFT)	435 kPa (8.62-kips/ SOFT)	460 kPa (8.62-kips/ SOFT)
	III			275 kPa• (5.76-kips/ SOFT)•	280 kPa• (5.81-kips/ SOFT)•	265 kPa (5.55-kips/ SOFT)	290 kPa (5.55-kips/ SOFT)	320 kPa (6.09-kips/ SOFT)	350 kPa (6.68-kips/ SOFT)	380 kPa (7.29-kips/ SOFT)	410 kPa (7.91-kips/ SOFT)	440 kPa (8.53-kips/ SOFT)	470 kPa (9.17-kips/ SOFT)	505 kPa (9.85-kips/ SOFT)	540 kPa (10.56-kips/ SOFT)	540 kPa (10.56-kips/ SOFT)			
F	I																		
	II																		
	III																		

*Indicates pressure at heel

■ Heavy vertical line indicates maximum allowable wall height for particular wall type and particular loading case.

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NO SCALE

C7GA

FOUNDATION PRESSURE - VERTICAL WALL

TYPE	LOADING CASE	WALL HEIGHT																	
		9775 mm (32'-7")	10050 mm (33'-6")	10325 mm (34'-5")	10600 mm (35'-4")	10875 mm (36'-3")	11150 mm (37'-2")	11425 mm (38'-1")	11700 mm (39'-0")	11975 mm (39'-1")	12250 mm (40'-10")	12525 mm (41'-9")	12800 mm (42'-8")	13075 mm (43'-7")	13350 mm (44'-6")	13625 mm (45'-5")	13900 mm (46'-4")	14175 mm (47'-3")	14450 mm (48'-2")
A	I																		
	II																		
	III																		
B	I																		
	II																		
	III																		
C	I																		
	II																		
	III																		
D	I																		
	II																		
	III																		
E	I	375 kPa (7.84-kips/ SOFT)	395 kPa (8.20-kips/ SOFT)	410 kPa (8.58-kips/ SOFT)	430 kPa (8.98-kips/ SOFT)	450 kPa (9.38-kips/ SOFT)	470 kPa (9.80-kips/ SOFT)	490 kPa (10.23-kips/ SOFT)	510 kPa (10.68-kips/ SOFT)										
	II	485 kPa (10.16-kips/ SOFT)	515 kPa (10.71-kips/ SOFT)																
	III																		
F	I	330 kPa (6.86-kips/ SOFT)	340 kPa (7.14-kips/ SOFT)	355 kPa (7.43-kips/ SOFT)	370 kPa (7.73-kips/ SOFT)	385 kPa (8.04-kips/ SOFT)	400 kPa (8.38-kips/ SOFT)	415 kPa (8.68-kips/ SOFT)	430 kPa (9.01-kips/ SOFT)	450 kPa (9.35-kips/ SOFT)	465 kPa (9.70-kips/ SOFT)	480 kPa (10.07-kips/ SOFT)	500 kPa (10.44-kips/ SOFT)	520 kPa (10.82-kips/ SOFT)	535 kPa (11.21-kips/ SOFT)	555 kPa (11.61-kips/ SOFT)	575 kPa (12.03-kips/ SOFT)	595 kPa (12.46-kips/ SOFT)	615 kPa (12.89-kips/ SOFT)
	II	405 kPa (8.48-kips/ SOFT)	425 kPa (8.91-kips/ SOFT)	450 kPa (9.35-kips/ SOFT)	470 kPa (9.80-kips/ SOFT)	490 kPa (10.27-kips/ SOFT)	515 kPa (10.75-kips/ SOFT)	540 kPa (11.25-kips/ SOFT)	565 kPa (11.76-kips/ SOFT)	590 kPa (12.29-kips/ SOFT)	615 kPa (12.83-kips/ SOFT)	640 kPa (13.39-kips/ SOFT)							
	III	585 kPa (12.22-kips/ SOFT)	620 kPa (12.93-kips/ SOFT)	655 kPa (13.65-kips/ SOFT)	690 kPa (14.40-kips/ SOFT)														

*Indicates pressure at heel

■ Heavy vertical line indicates maximum allowable wall height for particular wall type and particular loading case.


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REINFORCED CONCRETE CRIB WALL FOUNDATION PRESSURE - VERTICAL WALL

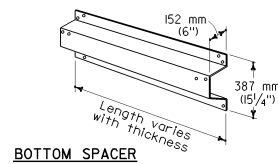
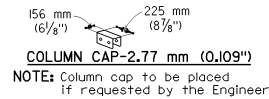
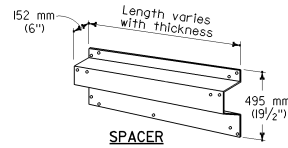
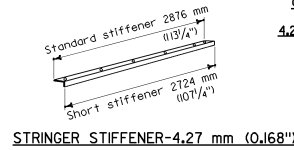
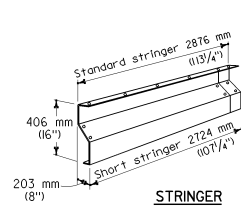
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NO SCALE

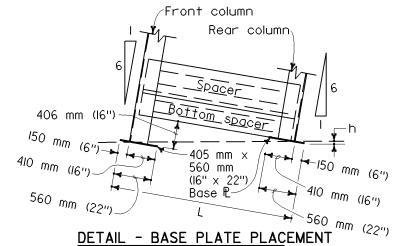
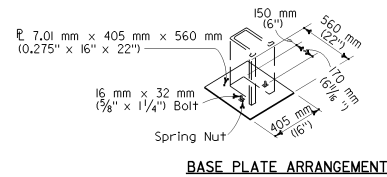
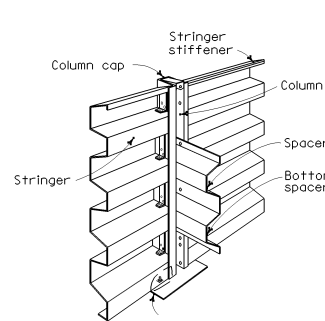
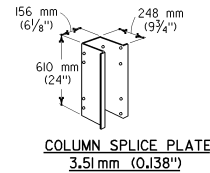
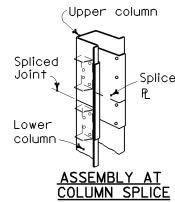
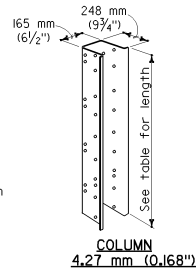
C7GB

DIST.	COUNTY	ROUTE	KILOMETER TOTAL PROJECT	POST NO.	SHEET NO.	TOTAL SHEETS
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NOTE: See table on Standard Plan C8B for thickness and length



NOTE

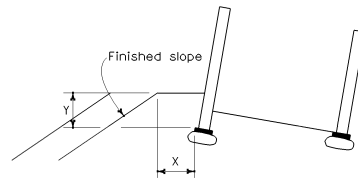
Distance h for type A wall is a minus quantity - that is, front column base is lower than rear column base. All bolts to be 16 mm (5/8 inches) with a minimum length of 32 mm (1 1/4 inches). Thickness given in millimeters.

GENERAL NOTES

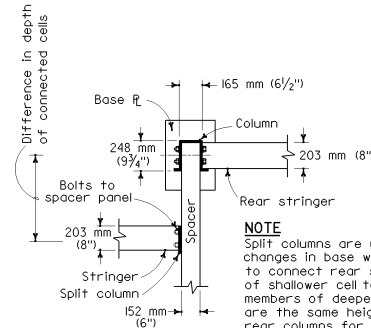
Design type to be shown on all crib wall layouts. For design data, see Standard Plans C8B and C8C

EMBEDMENT DATA			
Wall Type	X mm (in)	Y mm (in)	
A	600 (24)	750 (30)	
B	750 (30)	750 (30)	
C	900 (36)	900 (36)	
D	1050 (42)	900 (36)	
E	1250 (48)	900 (36)	
F	1400 (54)	900 (36)	

EMBEDMENT DETAIL



WALL TYPE	h mm (in)	L mm (in)
A	76 (3)	2022 (79 5/8)
B	35 (1 3/8)	2683 (105 5/8)
C	148 (5 7/8)	3348 (131 5/8)
D	259 (10 1/8)	4015 (158 1/8)
E	371 (14 5/8)	4682 (184 3/8)
F	476 (18 3/4)	5398 (212 1/2)



NOTE: Split columns are used at changes in base width to connect rear stringers of shallower cell to spacer members of deeper cell. They are the same height as the rear columns for the shallower cell.

DETAIL SPLIT COLUMN ATTACHMENT

STEEL CRIB WALL CONSTRUCTION DETAILS

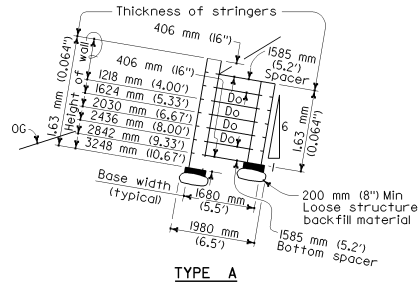
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NO SCALE

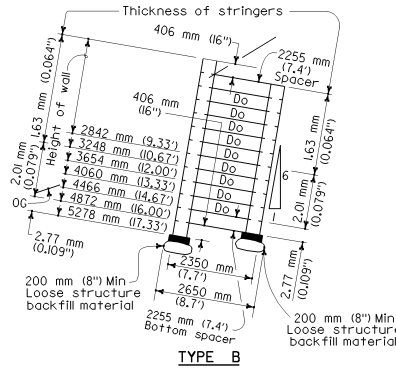
C8A

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
<p><i>Overcomer, Y. Ror</i> REGISTERED CIVIL ENGINEER July 1, 2002 PLANS APPROVAL DATE</p> <p><i>The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.</i> Caltrans now has a web site! To get to the web site, go to: https://www.dot.ca.gov</p>					

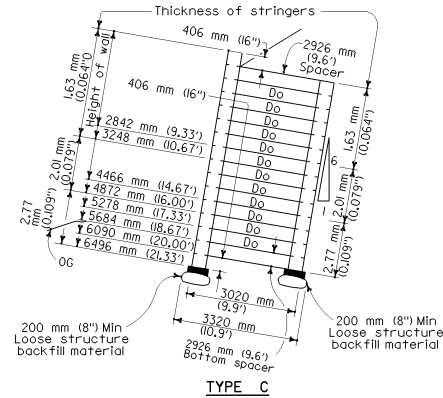
OVERCOMER, Y. ROR
No. C45803
Exp. 12-31-02
STATE OF CALIFORNIA



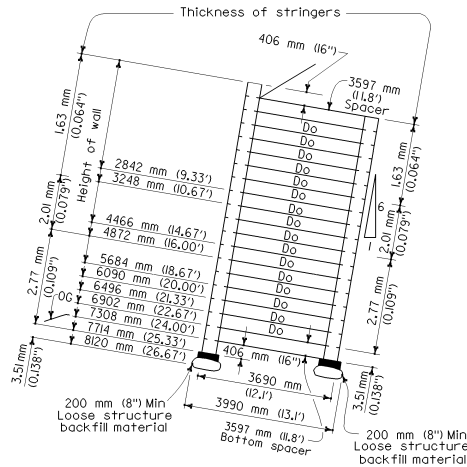
TYPE A



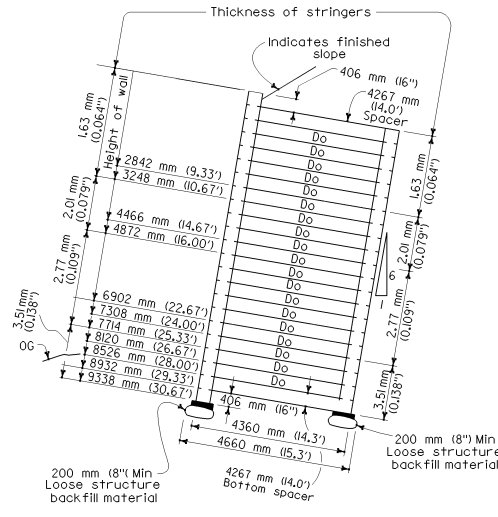
TYPE B



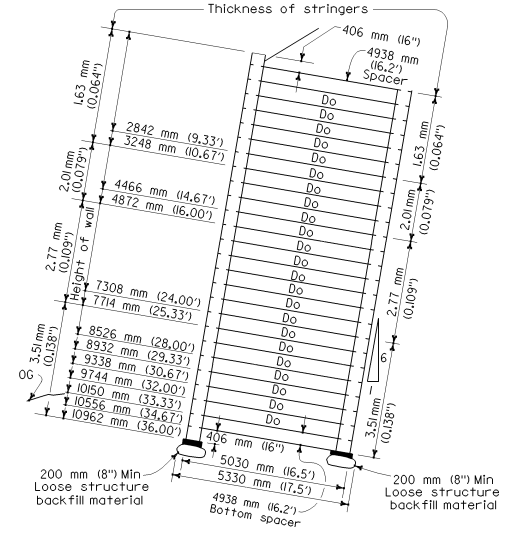
TYPE C



TYPE D



TYPE E



TYPE F

LEGEND

Do = Ditto

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**STEEL CRIB WALL
CONSTRUCTION DETAILS**

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NO SCALE

C8AA

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

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STEEL CRIB WALL DESIGN DATA

NO SCALE

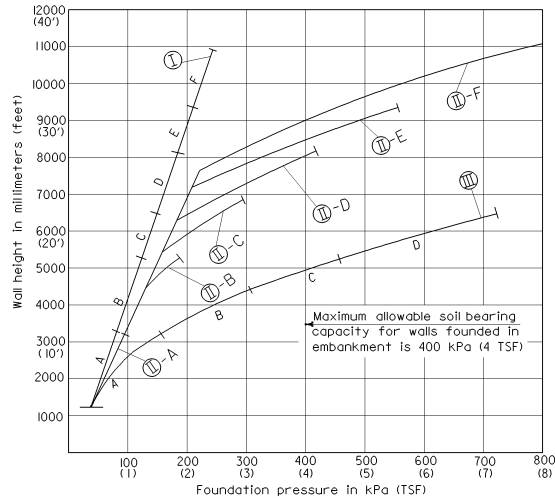
C8B

[Return to Table of Contents](#)

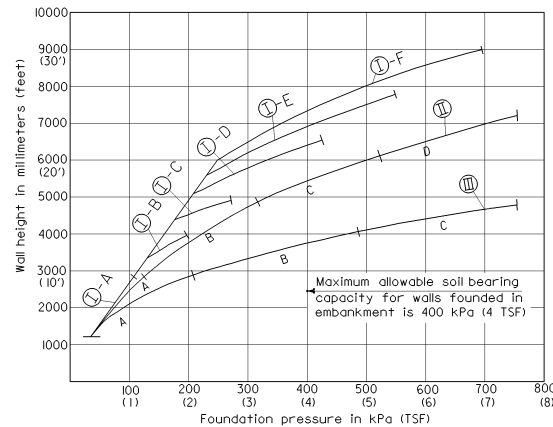
STEEL CRIB WALL DESIGN DATA

NO SCALE

C8B



6 : 1 (1 : 6) BATTERED WALL



VERTICAL WALL

DESIGN EXAMPLES

EXAMPLE NO. 1

- Given: Wall height 7300 millimeters (24').
Design loading Case II.
35 meters (115') maximum from toe of wall to top of slope.
Base in embankment 1500 millimeters (5') depth minimum.
Select: 6:1 (1:6) Battered wall. Vertical wall not permitted. Type D wall selected.
Maximum height on graph is 8050 millimeters (26') at 400 kPa (4 TSF). Since the foundation pressure is 305 kPa (3 TSF) at 7300 millimeters (24'), the wall must be founded on a 1500 millimeters (5') thickness of "Structure Backfill" (See Design Note 1). A drainage system behind this wall will be required.

EXAMPLE NO. 2

- Given: Wall height 8800 millimeters (29').
Design loading Case II. Foundation site investigation indicates lateral pressure from material above will be equivalent to 1:2 (2:1) embankment slope. Base in excavation level at toe of wall.
Foundation investigation determines the allowable soil bearing capacity at 300 kPa (3 TSF).
Select: Battered Type F wall maximum height at 400 kPa (4 TSF) is 9000 millimeters (29'). therefore the replacement of 1500 millimeters (5') of excavation with "Structure Backfill" to increase the allowable soil bearing capacity to 400 kPa (4 TSF) is required (See Design Note 1). A drainage system for this wall should be investigated.

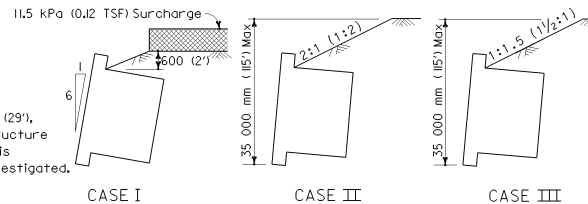
EXAMPLE NO. 3

- Given: Wall height 4600 millimeters (15').
Design loading Case III with overall height less than 35 meters (115'). Base on original ground. Foundation investigation determines allowable soil bearing capacity at 200 kPa (2 TSF).
Select: Use a Type C Battered Wall. However foundation pressure exceeds 200 kPa (2 TSF), therefore the replacement of 1500 millimeters (5') of excavation with "Structure Backfill" to increase the allowable soil bearing capacity to 400 kPa (4 TSF) is required (See Design Note 1).

LEGEND FOR GRAPHS

A, B, C, D, E, F = Wall Type
①, ②, ③ = Loading Case

- For description of loading case, see detail of design loading cases.
- Upper end of line indicates maximum wall height for a given wall type.



DETAIL OF DESIGN LOADING CASES

Note: Similar loading cases for vertical wall.

NOTE

For construction details see Sheet C8A.

DESIGN NOTES

1. Wall base in embankment: A minimum depth of 1500 mm (5') of embankment at 95% relative soil compaction is required below the base of all walls in order to constitute an embankment condition. When the foundation pressure is between 240 kPa and 400 kPa (2.5 TSF and 4 TSF), embankment below the wall shall consist of "Structure Backfill" material as set forth in Section 19-3.06 of the Standard Specifications. The limits of relative compaction (95 percent) shall be as set forth in Section 19-5.03 of the Standard Specifications.
2. Wall base in original ground: Allowable soil pressure at toe of wall shall be determined by foundation site investigation. Walls that are to retain cut slopes shall be designed for lateral and toe pressures determined from site investigation data. Overall stability of slope with wall in place must be analyzed. If original ground slopes away from toe of wall, reduction in allowable bearing capacity due to slope must be considered. Walls shall not be founded in original ground having an allowable bearing capacity of less than 145 kPa. Consideration should be given to removal and replacement of unsuitable material with "Structure Backfill" material as set forth in Section 19-3.06 of the Standard Specifications. The limits of relative compaction (95 percent) shall be as set forth in Section 19-5.03 of the Standard Specifications.
3. Drainage:
 - a. Internal: Section 19-3.06 of the Standard Specifications.
 - b. External: If the combined height of wall and overfill (measured along face of wall and vertically from the toe of fill to top of fill) exceeds 7600 mm (25') a system to drain water away from the back face of wall shall be provided. The type and extent of this system will depend on the type of backfill material expected to be used, the combined height of wall and backfill, and the location of the water table in the area.
4. Sloping Surcharge Limitations: The maximum height of fill behind any wall, or family of walls, shall not exceed 35 meters (115') (measured vertically from the toe of the bottom wall to the top of fill behind the uppermost wall. For a family of walls the slope of a line drawn from the top of the front face of the bottom wall to the top of the front face of any intermediate or top wall, shall in no case be steeper than 1:1.5 (1/2:1).

Material Specifications:

Steel sheets:
AASHTO M218
310 275 kPa (45,000 psi) Ultimate
227 535 kPa (35,000 psi) Yield
Ø 20% Elongation
Bolts: ASTM A307 Grade A

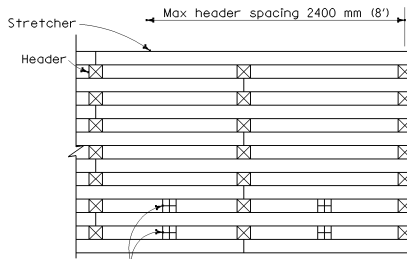
STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION STEEL CRIB WALL DESIGN DATA

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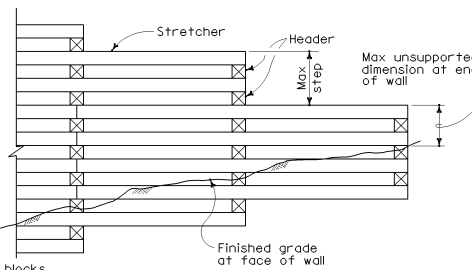
NO SCALE

C8C

DIST.	COUNTY	ROUTE	KILOMETER TOTAL PROJECT	POST NO.	SHEET NO.	TOTAL SHEETS
<p><i>Overcomer, Y. Rior</i> REGISTERED CIVIL ENGINEER</p> <p>July 1, 2002 PLANS APPROVAL DATE</p> <p>The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.</p> <p>Caltrans now has a web site! To get to the web site, go to: https://www.dot.ca.gov</p>						
<p>SEAL OF THE PROFESSIONAL ENGINEER Overcomer, Y. Rior No. C45803 Exp. 12-31-02 DATE OF EXPIRATION</p>						

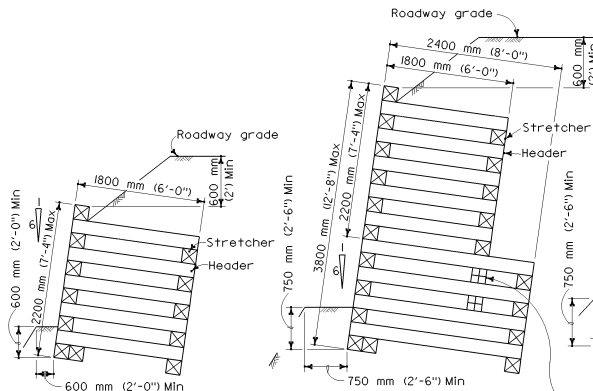


200 mm x 200 mm x 600 mm (8" x 8" x 2'-0") blocks at center of span. Bottom 2 spaces of all walls over 5400 mm (18'-0").

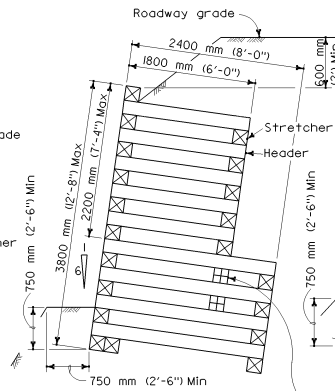


OPEN FACE CRIB PARTIAL ELEVATIONS

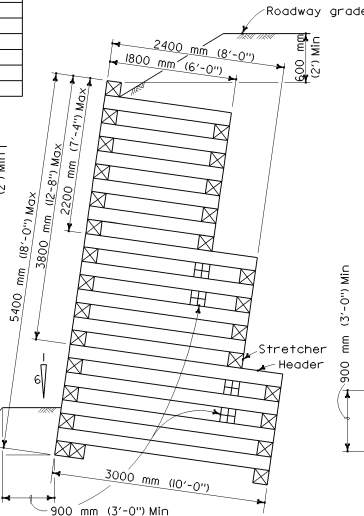
HEIGHT OF WALL	TIMBER PER 2400 mm (8') CRIB SECTION				STRETCHERS
	HEADERS				
1400 mm (4'-8")	3				8
1800 mm (6'-0")	4				10
2200 mm (7'-4")	5				12
2600 mm (8'-8")	4	2			14
3000 mm (10'-0")	5	2			16
3400 mm (11'-4")	5	3			18
3800 mm (12'-8")	5	4			20
4200 mm (14'-0")	5	3	2		22
4600 mm (15'-4")	5	4	2		24
5000 mm (16'-8")	5	4	3		26
5400 mm (18'-0")	5	4	4		28
5800 mm (19'-4")	5	4	3	2	33
6200 mm (20'-8")	5	4	4	2	38
6600 mm (22'-0")	5	4	4	3	43



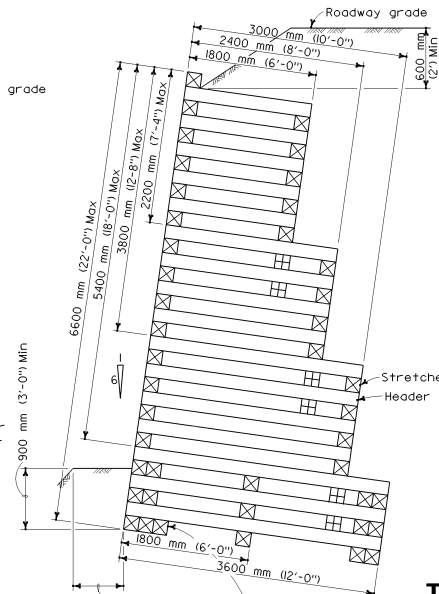
TYPE A



TYPE B



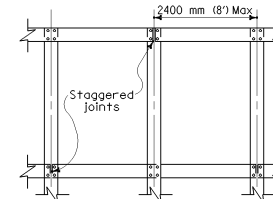
TYPE C



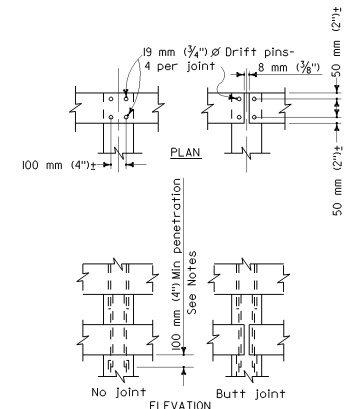
TYPE D

200 mm x 200 mm x 200 mm (8" x 8" x 8") blocks between headers. Use two courses at each change in crib section. Block to be toe-nailed with 2-16d nails.

Use 3 sills at front and double sills at rear of walls over 5400 mm (18'-0") high.



TYPICAL PLAN VIEW



TYPICAL END CONNECTIONS

NOTES

1. All timber to be treated 200 mm x 200 mm (4" x 4") full sawn No. 1 grade douglas fir-larch. All members to be pre-cut before treatment.
2. Drift pins and holes to be 19 mm (3/4") ϕ .
3. Drift pins to be of sufficient length to penetrate thru 2 members and 100 mm (4") minimum into the third member. Drift pins shall cross each contact joint between headers and stretchers. Pins may lap, provided edge or end distance to pins is not less than 45 mm (1 3/4").
4. All stretchers to be laid horizontal.
5. Vertical walls are not permitted.
6. Maximum allowable height is 6600 mm (22').
7. All walls 5400 mm (18') high or under shall have double sills at front and single sill at rear. When wall exceeds 2200 mm (7'-4"), 3800 mm (12'-8"), or 5400 mm (18'-0"), use a minimum of two courses of next longer headers.
8. For Design Data see Standard Plan C9B.

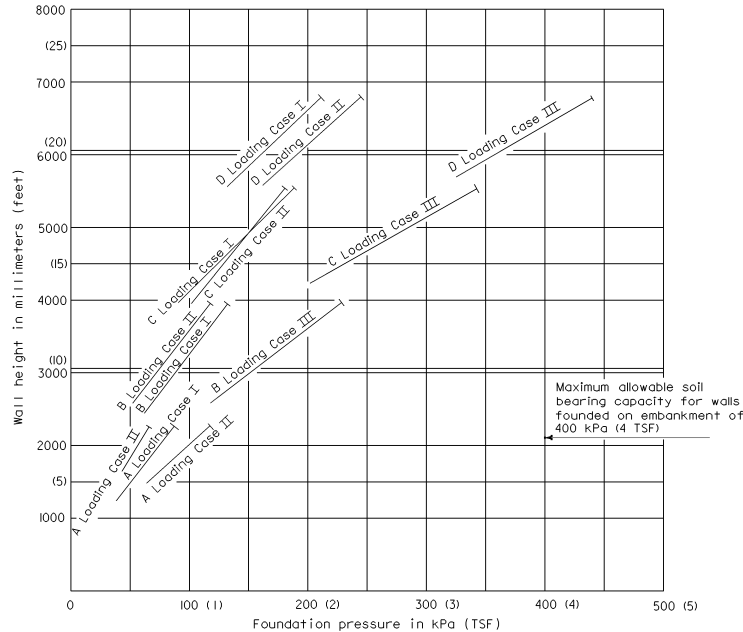
STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION TIMBER CRIB WALL TYPES A, B, C AND D

These "Standard Plans for Construction of Local Streets and Roads" contain units in two systems of measurement: International System of Units (SI or "metric") and United States Standard Measures shown in the parentheses ("). The measurements expressed in the two systems are not necessarily equal or interchangeable. See the "Foreword" at the beginning of this publication.

NO SCALE

C9A

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
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6:1 (1:6) BATTERED WALL

LEGEND FOR GRAPH

- A, B, C, D = Wall type.
- Solid lines indicate normal range of wall use.
- Upper end of line indicates maximum wall height for a given wall type and loading.
- For description of loading case see DETAIL OF DESIGN LOADING CASES.

DESIGN NOTES

- WALL BASE IN EMBANKMENT:** A minimum depth of 1500 mm (5') of embankment at 95% relative soil compaction is required below the base of all walls in order to constitute an embankment condition. When the foundation pressure is between 240 kPa (2.5 TSF) and 400 kPa (4 TSF) embankment below the wall shall consist of "Structure backfill" material as set forth in Section 19-3.06 of the Standard Specifications. The limits of relative compaction (95%) shall be as set forth in Section 19-5.03 of the Standard Specifications.
- WALL BASE IN ORIGINAL GROUND:** Allowable soil pressure at toe of wall shall be determined by foundation site investigation. Walls that are to retain cut slopes shall be designed for lateral and toe pressures determined from site investigation data. Overall stability of slope with wall in place must be analyzed. If original ground slopes away from toe of wall, reduction in allowable bearing capacity due to slope must be considered. Walls shall not be founded in original ground having an allowable bearing capacity of less than 145 kPa (1.5 TSF). Consideration should be given to removal and replacement of unsuitable material with "Structure backfill" material as set forth in Section 19-3.06 of the Standard Specifications. The limits of relative compaction (95%) shall be as set forth in Section 19-5.03 of the Standard Specifications.
- Soil Parameters:**
 - Backfill - $\phi = 34^\circ$, $\gamma = 19 \text{ kN/m}^3$ (120 lb/CF)
 - Foundation - $\phi = 34^\circ$
 - Lateral earth pressure determined by Rankine Theory.

DESIGN EXAMPLES

EXAMPLE NO. 1

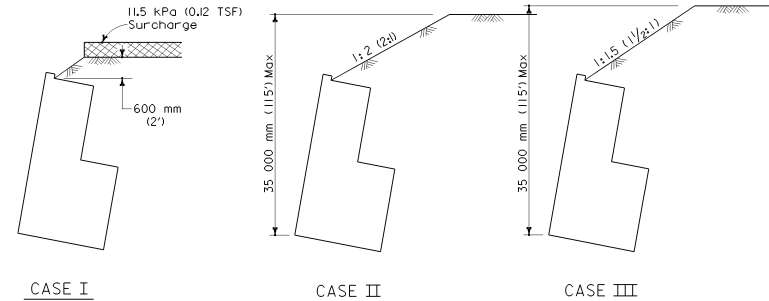
- Given: Wall height 4200 mm (14'-0")
Design Loading Case II.
Base in embankment (1500 mm depth minimum See Note 1).
Select: 6d (16) batter C wall gives 115 kPa (1.20 TSF) foundation pressure.
Vertical Wall not permitted.
See chart for required numbers and sizes of timber members.

EXAMPLE NO. 2

- Given: Wall height 5800 mm (19'-4")
Design Loading Case III. Base is in original ground.
Foundation site investigation determines the allowable soil bearing capacity at 300 kPa (3 TSF).
Select: 6d (16) batter D wall gives 335 kPa (3.5 TSF) foundation pressure.
Vertical wall not permitted. Since foundation pressure is greater than allowable bearing capacity of native material, replace original material with "Structure backfill" to increase base bearing capacity. (See Note 2)

EXAMPLE NO. 3

- Given: Wall height 6600 mm (22'-0")
Design Loading Case II. Base is in embankment.
(See Note 1)
Select: 6d (16) batter D wall gives 230 kPa (2.4 TSF) foundation pressure.
Vertical wall not permitted. Foundation pressure is less than 240 kPa (2.5 TSF) Base material below wall shall be compacted to a relative compaction of 95%. (See Note 1).



DETAIL OF DESIGN LOADING CASES

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION TIMBER CRIB WALL TYPES A, B, C AND D DESIGN DATA

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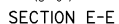
NO SCALE

C9B

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
July 1, 2002 PLANS APPROVAL DATE					
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CURB OPENING DETAILS



NOTES

1. "H" is the difference in elevation between the outlet pipe flow line and the normal gutter grade line undepressed at the curb face.
2. For "T" wall thickness, see Table A below.
3. Height of curb opening will vary with the type of curb and the depth of the local depression.
4. Wall reinforcing not required when "H" is 2.5 m (8') or less and the unsupported width or length is 2.1 m (7') or less. Walls exceeding these limits shall be reinforced with #13M bars @ 450 mm (#4 @ 18") centers placed 40 mm (1 1/2") clear to inside of box unless otherwise shown.
5. Inlet bottom reinforcing not required. See Standard Plan D74C for alternative reinforced bottom.
6. Steps- None required where "H" is less than 0.75 m (30"). Where "H" is 0.75 m (30") or more, install steps not more than 150 mm (6") above the floor and highest rung not more than 150 mm (6") below top of inlet. The distance between steps shall not exceed 300 mm (12") and be uniform throughout the length of the wall. Place steps in the wall without an opening. Step inserts may be substituted for the bar steps. Step inserts shall comply with State Industrial Safety requirements. See Standard Plan D74C for step details.
7. When shown on the project plans, place a 19 mm (3/4") plain round protection bar horizontally across the length of the opening and bend back 100 mm (4") into the inlet wall on each side.
8. Pipes can be placed in any wall.
9. Curb section shall match adjacent curb.
10. Except for inlets used as junction boxes, basin floor shall have a minimum slope of 1:4 (12:3) from all directions toward outlet pipe and shall have a wood trowel finish.
11. Galvanizing- See Standard Specifications or Special Provisions.
12. See Standard Plans D77A and D77B for grate and frame details and masses weights of miscellaneous iron and steel.
13. See Standard Plan D78 for gutter depression details.
14. Full penetration butt welds may be substituted for the fillet welds on all anchors.
15. Standard square, hexagon, round or equivalent headed anchors may be substituted for the right angle hooks on the anchors shown on this plan.
16. Cast-in-place or precast alternative is optional with contractor. See Standard Specifications.

TABLE A

CONCRETE QUANTITIES					
Type	H=0.90 m to 2.50 m (3'-0" to 8'-0") (T=150 mm (6"))	Additional PCC per m ² (ft ²)	H=2.51 m to 6.00 m (8'-1" to 20'-0") (T=200 mm (8"))	Additional PCC per m ² (ft ²)	
	m ³ (CY)	m ³ (CY)	m ³ (CY)	m ³ (CY)	
OS	1.04 (1.4)	0.69 (2.78)	2.91 (3.8)	0.96 (1.37)	
OL-2.1 m (7')	1.42 (1.92)	0.69 (2.78)	3.58 (4.29)	0.96 (1.37)	
OL-3.0 m (10')	1.77 (2.39)	0.69 (2.78)	3.65 (4.77)	0.96 (1.37)	
OL-4.3 m (14')	2.26 (3.06)	0.69 (2.78)	4.17 (5.45)	0.96 (1.37)	
OL-6.4 m (21')	3.33 (4.42) *	0.69 (2.78)	5.18 (6.78)	0.96 (1.37)	
COL-2.1 m (7')	1.72 (2.33)	0.78 (3.13)	4.76 (5.47)	1.07 (1.43)	
COL-3.0 m (10')	2.10 (2.84)	0.78 (3.13)	5.48 (6.78)	1.07 (1.43)	

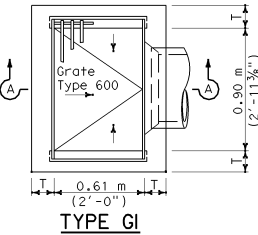
*Based on H=0.95 m (3'-1")
Table based on 200 mm (8") floor slab, no deduction for pipe openings, 180 mm (7") curb openings, and curb type giving highest quantity of concrete. No deductions or adjustments are to be made to these quantities because of pipe openings, different floor alternatives, different curb types or different height of curb openings.

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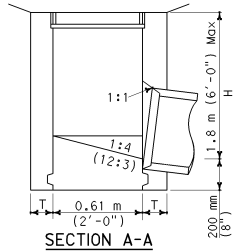
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NO SCALE

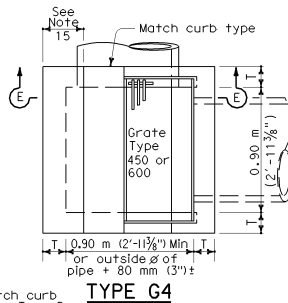
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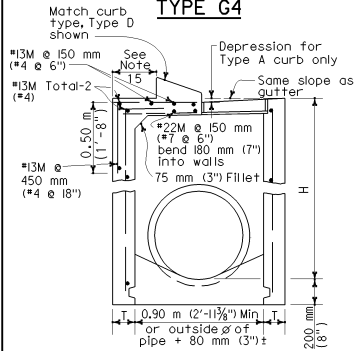
TYPE G1



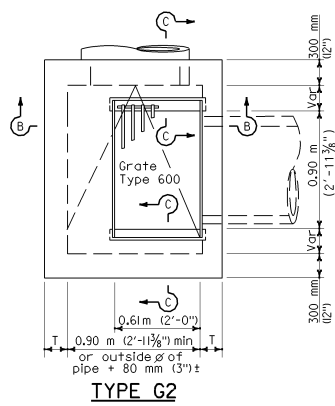
SECTION A-A



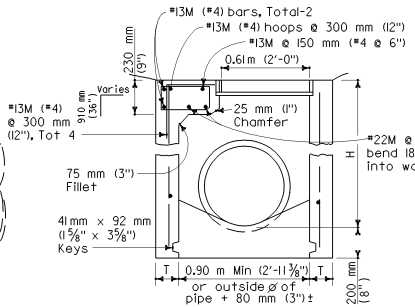
TYPE G4



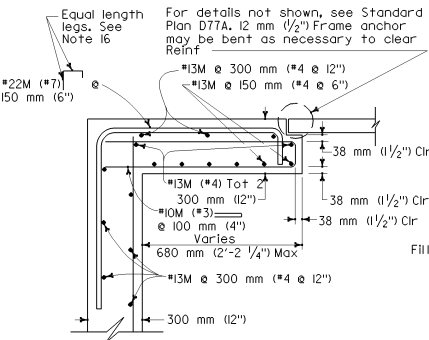
SECTION E-E



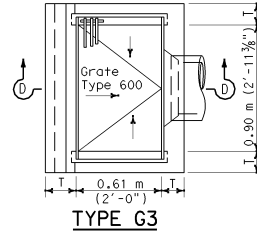
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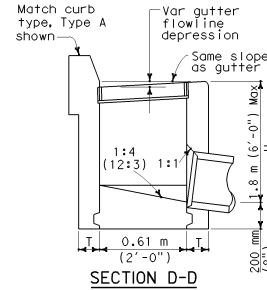
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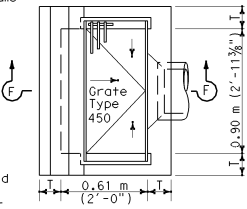
SECTION C-C



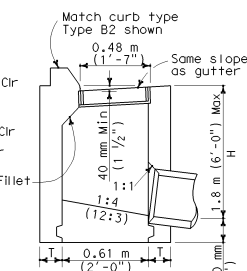
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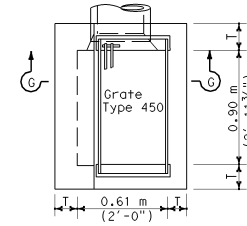
SECTION D-D



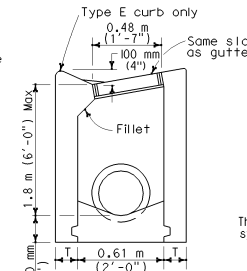
TYPE G5



SECTION F-F



TYPE G6



SECTION G-G

NOTES:

- "H" is the difference in elevation between the outlet pipe flow line and the normal gutter grade line undrained.
- For "T" wall thickness, see Table A below.
- Wall reinforcing not required when "H" is 2.5 m (8') or less and the unsupported width or length is 2.1 m (7') or less. Walls exceeding these limits shall be reinforced with #13M bars @ 450 mm (#4 @ 18") centers placed 40 mm (1 1/2") clear to inside of box unless otherwise shown.
- Inlet bottom reinforcing not required. See Standard Plan D74C for alternative reinforced bottom and alternative half round bottom.
- Steps-None required where "H" is less than 0.75 m (30"), where "H" is 0.75 m (30") or more, install steps with lowest rung 300 mm (12") above the floor and highest rung not more than 150 mm (6") below top of inlet. The distance between steps shall not exceed 300 mm (12") and shall be uniform throughout the length of the wall. Place steps in the wall without an opening. Step inserts may be substituted for the bar steps. Step inserts shall comply with State Industrial Safety requirements. See Standard Plan D74C for step details.
- Details shown apply to both metal and concrete pipe.
- Pipe(s) can be placed in any wall.
- Curb section shall match adjacent curb.
- Basin floors shall have wood trowel finish and a minimum slope of 1:4 (12:3) from all directions toward outlet pipe.
- Galvanizing - See Standard Specifications or Special Provisions.
- Cast-in-place or Precast alternative is optional with contractor. See Standard Specifications.
- Set inlet so that grate bars are parallel to direction of principal surface flow.
- See Standard Plans D77A and D77B for grate and frame details and masses (weights) of miscellaneous iron and steel.
- See Standard Plan D78 for gutter depression details.
- This dimension will vary with different grates, curb types, box width and wall thickness.
- Bar may be rotated as necessary to clear opening.

TABLE A

CONCRETE QUANTITIES

Type	H=0.90 m (3'-0") to 2.50 m (8'-0") (T=150 mm (6"))		H=2.51 m (8'-1") to 6.00 m (20'-0") (T=200 mm (8"))	
	H=0.90 m (3'-0") m ³ (CY)	Additional PCC per meter (foot) m ³ (CY)	H=2.51 m (8'-1") m ³ (CY)	Additional PCC per meter (foot) m ³ (CY)
G-1	0.69 (0.95)	0.55 (0.220)	(1)	(1)
G-2*	1.31 (1.74)	0.99 (0.395)	3.32 (4.28)	1.14 (0.454)
G-3	0.75 (1.03)	0.55 (0.220)	(1)	(1)
G-4* (Type 600)	0.93 (1.27)	0.63 (0.257)	2.67 (3.48)	0.88 (0.360)
G-4* (Type 450)	0.95 (1.30)	0.63 (0.257)	2.69 (3.50)	0.88 (0.360)
G-5	0.75 (1.02)	0.55 (0.220)	(1)	(1)
G-6	0.76 (1.04)	0.55 (0.220)	(1)	(1)


(1) Maximum allowable height 1.8 m (6'-0"). Table based on 200 mm (8") floor slab. No deductions are to be made to these quantities because of pipe openings, different floor alternatives or different curb types. *Quantities for type G-2 and G-4 inlets based on the minimum interior dimensions shown.

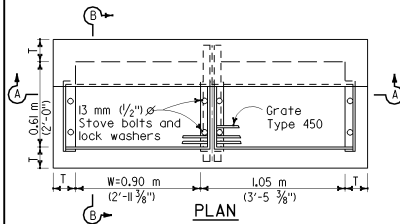
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
DRAINAGE INLETS

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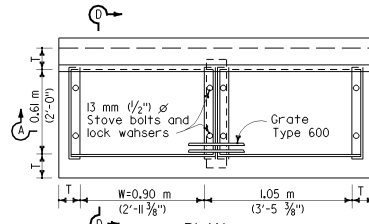
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D73

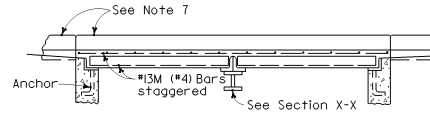
DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
 REGISTERED CIVIL ENGINEER No. C24541 Exp. 9-30-03 STATE OF CALIFORNIA					
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PLAN
TYPE GT1

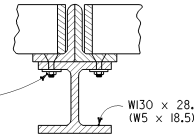


PLAN
TYPE GT3

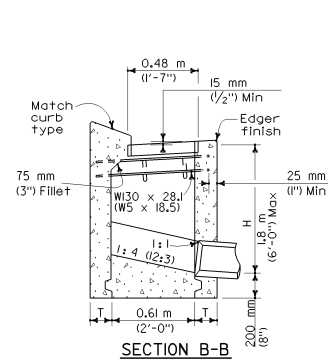


SECTION A-A

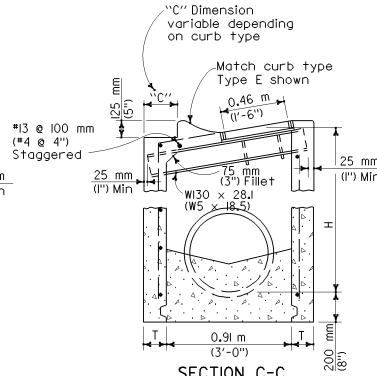
13 mm (1/2\") ϕ Stove bolts and lock washers
Place between grate slots, total 4



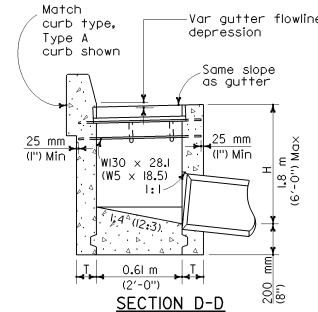
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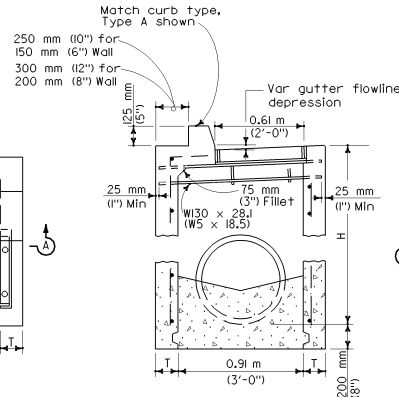
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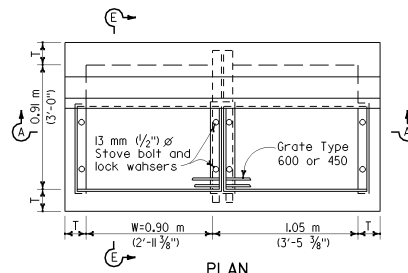
SECTION C-C



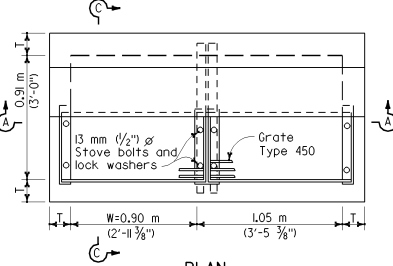
SECTION D-D



SECTION E-E



PLAN
TYPE GT4



PLAN
TYPE GT2

NOTES:

- "H" is the difference in elevation between the outlet pipe flow line and the normal gutter grade line depressed.
- For "T" wall thickness, see Table A below.
- Wall reinforcing not required when "H" is 2.5 m (8') or less and the unsupported width or length is 2.1 m (7') or less. Walls exceeding these limits shall be reinforced with #13M bars @ 450 mm (#4 bars @8') centers placed 40 mm (1 1/2") clear to inside of box unless otherwise shown.
- Inlet bottom reinforcing not required. See Standard Plan D74C for alternative reinforced bottom.
- Steps - None required where "H" is less than 0.75 m (30"). Where "H" is 0.75 m (30") or more, install steps with lowest rung 300 mm (12") above the floor and highest rung not more than 150 mm (6") below top of inlet. The distance between steps shall not exceed 300 mm (12") and shall be uniform throughout the length of the wall. Place steps in the wall without an opening. Step inserts may be substituted for the bar steps. Step inserts shall comply with State Industrial Safety requirement. See Standard Plan D74C for step details.
- Pipe(s) can be placed in any wall.
- Curb section shall match adjacent curb.
- Basin floors shall have wood trowel finish and a minimum slope of 1:4 (12:3) from all directions toward outlet pipe.
- Galvanizing - See Standard Specifications or Special Provisions.
- W = 0.90 m (2'-11 3/8") for one grate. Add 1.05 m (3'-5 3/8") for additional grates in tandem.
- See Standard Plans D77A and D77B for grate and frame details and masses (weights) of miscellaneous iron and steel.
- See Standard Plan D78 for gutter depression details.
- Full penetration butt welds may be substituted for the fillet welds on all anchors.
- Standard square, hexagon, round or equivalent headed anchors may be substituted for the right angle hooks on the anchors shown on this plan.
- Cast-in-place or precast alternative is optional with contractor. See Standard Specifications.

TABLE A

TYPE	CONCRETE QUANTITIES		CONCRETE QUANTITIES	
	H=0.90 m (3'-0") TO 2.50 m (8'-0") (T=150 mm (6"))	ADDITIONAL PCC PER METER (FOOT) m ³ (CY)	H=2.51 m (8'-1") TO 6.00 m (20'-0") (T=200 mm (8"))	ADDITIONAL PCC PER METER (FOOT) m ³ (CY)
GT1	1.28 (4.74)	0.87 (0.348)	(1)	(1)
GT2	1.55 (2.11)	0.96 (0.385)	4.08 (5.40)	1.31 (0.530)
GT3	1.27 (4.73)	0.87 (0.348)	(1)	(1)
GT4	1.60 (2.18)	0.96 (0.385)	4.09 (5.40)	1.31 (0.530)

(1) Maximum allowable height = 1.8 m (6'-0")
Table based on 200 mm (8") floor slab, no deduction for pipe openings, and curb type giving highest quantity of concrete. No deductions or adjustments are to be made to these quantities because of pipe openings, different floor alternatives or different curb type.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DRAINAGE INLETS

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NO SCALE

D74A

DIST	COUNTY	ROUTE	KILOMETER TOTAL PROJECT	POST NO.	SHEET NO.	TOTAL SHEETS

Glenn DeCruz
REGISTERED CIVIL ENGINEER
No. C24541
Exp. 9-30-03
DATE OF EXPIRATION

July 1, 2002
PLANS APPROVAL DATE

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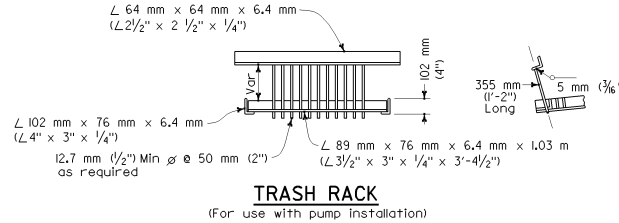
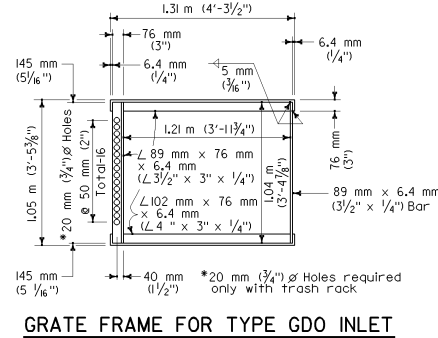
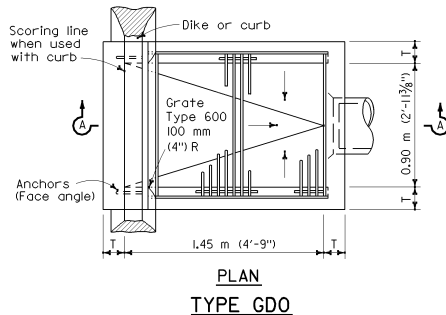
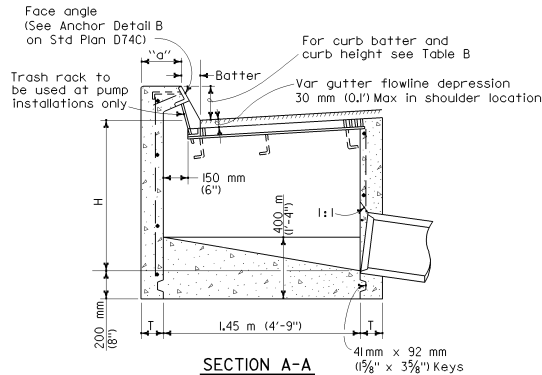
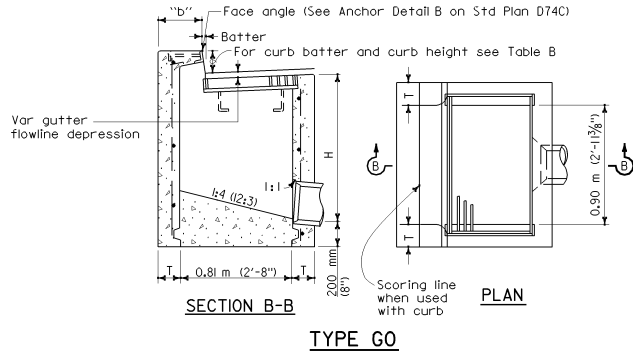


TABLE B

CURB TYPE	NORMAL CURB HEIGHT	CURB BATTER	"a" DIMENSION	"b" DIMENSION
A-150	150 mm (6")	40 mm (1 1/2")	T+190 mm (7 1/2")	T+160 mm (6 1/2")
A-200	200 mm (8")	50 mm (2")	T+180 mm (7")	T+150 mm (6")
B	150 mm (6")	100 mm (4")	T+130 mm (5")	T+100 mm (4")
Dike	150 mm (6")	75 mm (3")	T+155 mm (6")	T+125 mm (5")

TABLE A

CONCRETE QUANTITIES

TYPE	H=0.90 m (3'-0") to 2.50 m (8'-0") T=150 mm (6")	H=2.51 m (8'-1") to 6.00 m (20'-0") T=200 mm (8")
	ADDITIONAL PCC PER METER (FOOT) m ³ (CY)	ADDITIONAL PCC PER METER (FOOT) m ³ (CY)
GO	0.91mm (0.24)	0.61mm (0.245)
GDO	1.21mm (0.62)	0.80mm (0.322)

Table based on 200 mm (8") floor slab, no deduction for pipe openings, and curb type giving highest quantity of concrete. No deductions or adjustments are to be made to these quantities because of pipe openings, different floor alternatives or different curb type.

DIST.	COUNTY	ROUTE	KILOMETER	POST	SHEET	TOTAL
TOTAL PROJECT NO. SHEETS						
REGISTERED CIVIL ENGINEER Glenn DeCau No. C24541 Exp. 9-30-03 STATE OF CALIFORNIA						
July 1, 2002 PLANS APPROVAL DATE						
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NOTES:

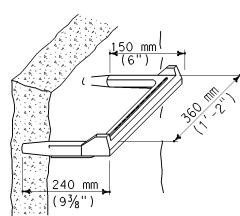
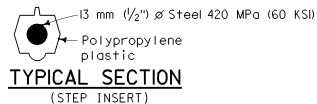
- "H" is the difference in elevation between the outlet pipe flow line and the normal gutter grade line undepressed.
- For "T" wall thickness, see Table A below.
- Wall reinforcing not required when "H" is 2.5 m (8') or less and the unsupported width or length is 2.1 m (7') or less. Walls exceeding these limits shall be reinforced with #13M bars @ 450 mm ± (#4 @ 18" ±) centers placed 40 mm (1 1/2") clear to inside of box unless otherwise shown.
- Inlet bottom reinforcing not required. See Standard Plan D74C for alternative reinforced bottom.
- Steps - None required where "H" is less than 0.75 m (30"). Where "H" is 0.75 m (30") or more, install steps with lowest rung 300 mm (12") above the floor and highest rung not more than 150 mm (6") below top of inlet. The distance between steps shall not exceed 300 mm (12") and shall be uniform throughout the length of the wall. Place steps in the wall without an opening. Step inserts may be substituted for the bar steps. Step inserts shall comply with State Industrial Safety requirements. See Standard Plan D74C for step details.
- When shown on the project plans, place a #19 (#6) protection bar horizontally across the length of the opening and bend back 100 mm (4") into the inlet wall on each side.
- Pipe(s) can be placed in any wall.
- Curb section shall match adjacent curb.
- Basin floors shall have wood trowel finish and shall slope toward the outlet pipe as shown.
- Galvanizing - See Standard Specifications or Special Provisions.
- See Standard Plan D77A and D77B for grate and frame details and masses (weights) of miscellaneous iron and steel.
- See Standard Plan D78 for gutter depression details.
- Full penetration butt welds may be substituted for the fillet welds on all anchors.
- Standard square, hexagon, round or equivalent headed anchors may be substituted for the right angle hooks on the anchors shown on this plan.
- Cast-in-place or precast alternative is optional with contractor. See Standard Specifications.

DRAINAGE INLETS

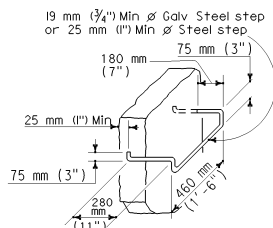
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NO SCALE

D74B

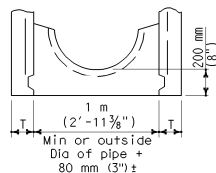


STEP INSERT

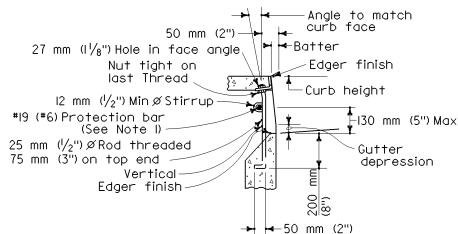
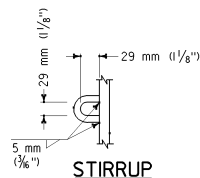


BAR STEP

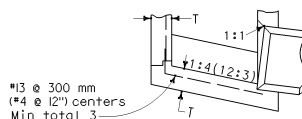
STEP DETAILS



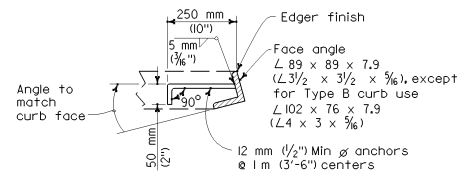
ALTERNATIVE
HALF ROUND BOTTOM



CURB SUPPORT
DETAIL
See Note 2

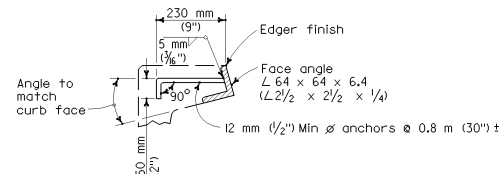


ALTERNATIVE
REINFORCED BOTTOM



FACE ANGLE ANCHOR DETAIL A

FACE ANGLE DETAIL A	
Length of Curb Opening	No. of Anchors
1.1 m (3'-6") or Less	2
2.1 m (7'-0")	3
3.0 m (10'-0")	4
4.3 m (14'-0")	5
6.4 m (21'-0")	7



FACE ANGLE ANCHOR DETAIL B

NOTES

- When shown on the project plans, place a #19 (#6) protection bar horizontally across length of the opening and bend back 100 mm (4") into the inlet wall on each side.
- Curb supports shall be evenly spaced and minimal in number such that maximum span of unsupported curb is 2.1 m (7').

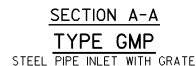
STATE OF CALIFORNIA
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DRAINAGE INLET DETAILS

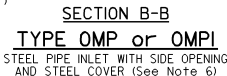
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NO SCALE

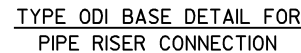
D74C



TYPE ODI
STEEL PIPE INLET WITH GRATE AND
RAISED OPENING AT AC DIKE FLOWLINE



TYPE ODI
STEEL PIPE INLET WITH GRATE AND
RAISED OPENING AT AC DIKE FLOWLINE



PIPE INLETS

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NO SCALE

D75A

DIST.	COUNTY	ROUTE	KILOMETER TOTAL	POST PROJECT	SHEET NO.	TOTAL SHEET

Glenn DeCou
 REGISTERED CIVIL ENGINEER

July 1, 2002
 PLANS APPROVAL DATE

Glenn DeCou
 REGISTERED PROFESSIONAL ENGINEER
 No. C34547
 Exp. 9-30-03
 CIVIL
 STATE OF CALIFORNIA

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NOTES:

1. For Details of concrete pipe inlets, see Standard Plan D75B.
2. For details of ladder and steps and when ladder or steps are required, see Standard Plan D75C.
3. Inlet pipes shall not protrude into basin.
4. Except for inlet boxes, inlet boxes, basin floors shall have minimum slope of 1:4 (2%) from all directions toward outlet pipe, and a wood trowel finish.
5. See Standard Plans D77A and D77B for Grate and Frame Details and mass (weight) of Miscellaneous Iron and Steel.
6. Deposition of trash OMP pipe inlet is required. Indicates trash racks are to be furnished and installed on all slide openings. See Standard Plan D75C for trash rack details.
7. More than one slide opening may be required. Location and number as ordered by the Engineer.
8. Chain to be provided when specified.
9. Caulk seal with pliable mixture of sand, portland cement, and emulsified asphalt (mixture of 1 part portland cement, 3-5 parts sand, and 1/2 parts SSI emulsified asphalt).
10. Gate pipe and 1/2 parts of grate will be parallel with main surface flow.

DIST.	COUNTY	ROUTE	KILOMETER TOTAL PROJECT	POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

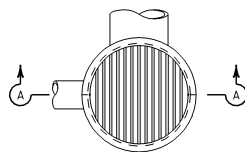
Glenn DeCo
REGISTERED CIVIL ENGINEER

July 1, 2002
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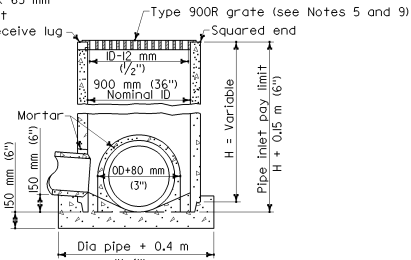
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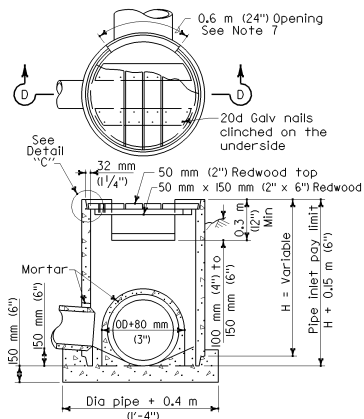
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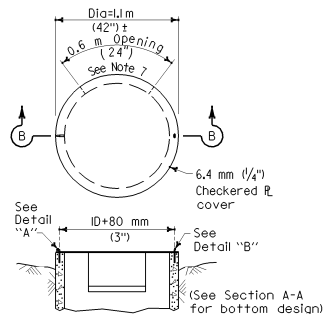
Cast 25 mm x 65 mm
(1" x 2 1/2") slot
in pipe to receive lu



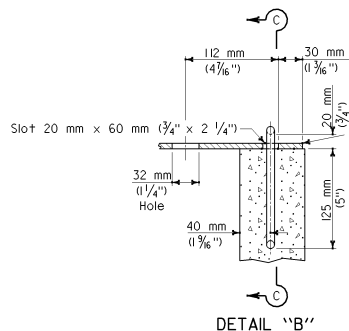
SECTION A-A
TYPE GCP
CONCRETE PIPE INLET WITH GRATE



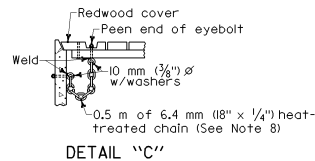
SECTION D-D
TYPE OCP or OCPI
CONCRETE PIPE INLET WITH REDWOOD COVER
(See Notes 6 and 10)



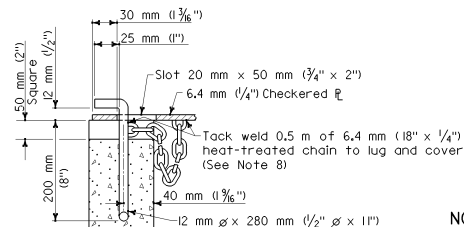
SECTION B-B
TYPE OCP or OCPI
CONCRETE PIPE INLET WITH STEEL COVER
(See Note 6)



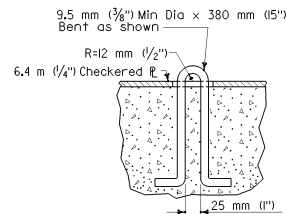
DETAIL "B"



DETAIL "C"



DETAIL "A"



SECTION C-C

NOTES:

1. For details of steel pipe inlets, see Standard Plan D75A.
2. For details of ladder and steps and when ladder or steps are required, see Standard Plan D75C.
3. Inlet pipes shall not protrude into basin.
4. Except for inlets used for junction boxes, basin floors shall have minimum slope of 1:4 (1/23) from all directions toward outlet pipe, and a wood trowel finish.
5. See Standard Plans D75A and D75C for Gate and Frame Details and Weights of Miscellaneous Iron and Steel.
6. Designation of Type OCPI pipe inlets on plans indicates trash racks are to be furnished and installed on all side openings. See Standard Plan D75C for Trash rack details.
7. More than one side opening may be required. Location and number as ordered by the Engineer. Opening may be cast in pipe.
8. Chain to be provided when specified.
9. Place pipe so bars of grate will be parallel with main surface flow.
10. Redwood covers not to be used where there is a possibility of wheelloads. Use Type GCP inlet where there is a possibility of wheelloads.

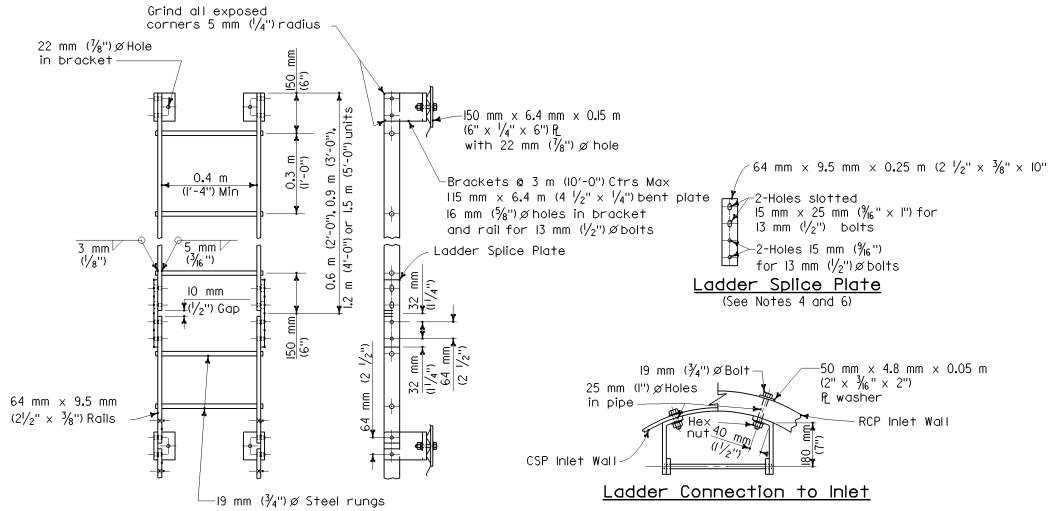
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
PIPE INLETS

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NO SCALE

D75B

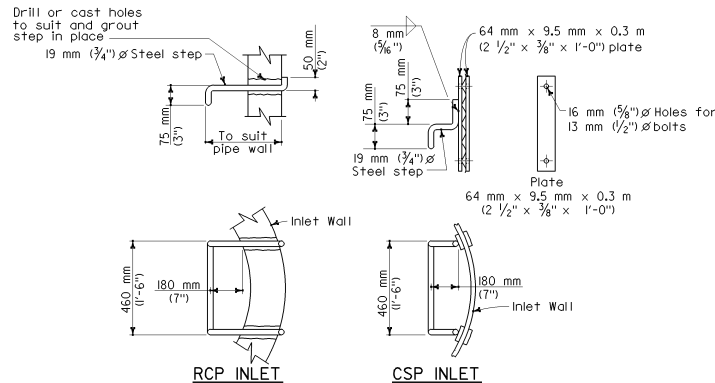
DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
<p>Glenn DeCou REGISTERED CIVIL ENGINEER</p> <p>July 1, 2002 PLANS APPROVAL DATE</p> <p>The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.</p> <p>Caltrans now has a web site. To get to the web site, go to: http://www.dot.ca.gov</p>					
<p>Glenn DeCou No. C24541 Exp. 9-30-03 Civil STATE OF CALIFORNIA</p>					



Ladder Connection to Inlet

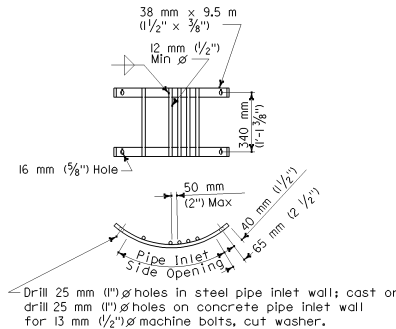
LADDER DETAILS

See Notes 1, 2, 3, 4 and 6



STEP DETAILS

(See Notes 1 and 6)



TRASH RACK DETAILS

(See Notes 5 and 6)

NOTES:

- Ladders and Steps - None required where "W" dimension of pipe inlet is less than 0.75 m (30"). Where "W" is 0.75 m (30") or more, install steps or ladder with lowest rung not more than 0.3 m (12") above the floor and highest rung not more than 0.3 m (12") below top of inlet. The distance between steps or rungs shall not exceed 0.3 m (12") and shall be uniform throughout the length of the wall. Place steps or ladder in the wall without an opening.
- Ladder may be constructed in one length at contractor's option on RCP inlet.
- On CSP inlet, connect ladder splice plate so joint can compress 10 mm (1/2").
- Ladder splice plate to be connected with 13 mm (1/2") ϕ bolts with double nuts.
- Trash racks used on Type OCPI and OMPI inlets. Trash racks required for pumping installations.
- All hardware to be galvanized after fabrication. See Standard Specifications or Special Provisions.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

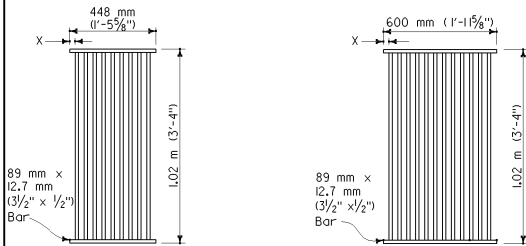
PIPE INLETS

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NO SCALE

D75C

DIST	COUNTY	ROUTE	KILOMETER	POST	SHEET	TOTAL
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TYPE 450-9

35 mm (1 3/8") Clear spacing. Use within the roadbed on highways where bicycles and pedestrians are excluded.

TYPE 600-9

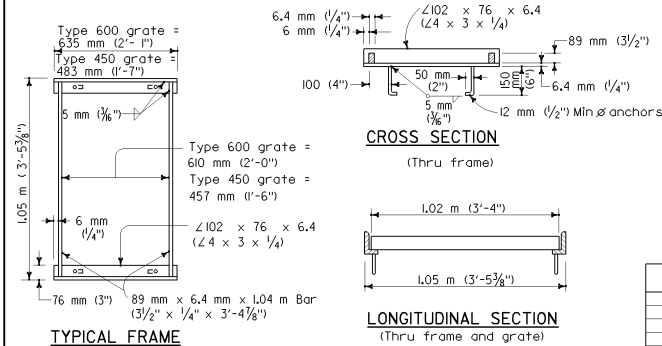
51 mm (2") Clear spacing. Use in locations off the roadbed on all types of highways.

TYPE 600-12

35 mm (1 3/8") Clear spacing. Use within the roadbed on highways where bicycles and pedestrians are excluded.

RECTANGULAR GRATE DETAILS

(See table below)



TYPICAL FRAME

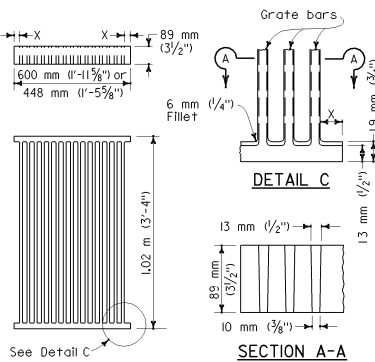
RECTANGULAR FRAME DETAILS

(For all rectangular grates)

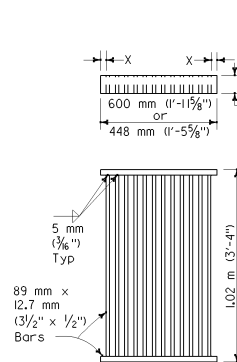
GRATE BAR SPACING TABLE

TYPE	NO. OF BARS	CLEAR BAR SPACING mm (in)	X mm (in)
450-9	9	35 (1 3/8")	27 (1 1/8")
600-9	9	51 (2")	40 (1 5/8")
600-12	12	35 (1 3/8")	32 (1 1/4")

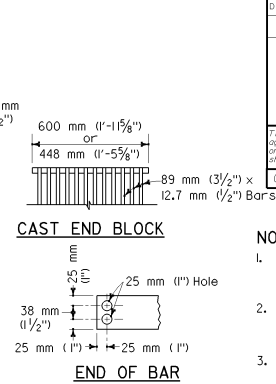
INLET TYPE	COVER TYPE	MASS (WEIGHT) kg (LB)
OS	PLATE	79 (174)
OL-2.1 m (7')	PLATE	77 (170)
OL-3.0 m (10')	PLATE	77 (170)
OL-4.3 m (14')	PLATE	77 (170)
OL-6.4 m (21')	PLATE	77 (170)
OCPI	PLATE	51 (112)
OCPI	PLATE	51 (112)
OCPI	REWOOD	19 (42)
OMP	PLATE	80 (177)
OMPI	PLATE	80 (177)



ALTERNATIVE CAST NODULAR IRON GRATE OR CAST STEEL GRATE

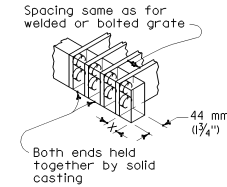


ALTERNATIVE WELDED GRATE

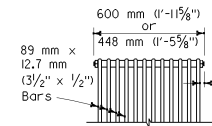


CAST END BLOCK

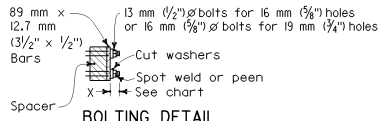
END OF BAR



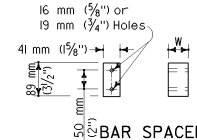
ALTERNATIVE CAST NODULAR IRON OR CAST STEEL END BLOCK GRATE



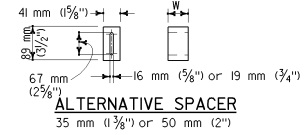
BOLTED END BLOCK



BOLTING DETAIL



BAR SPACER



ALTERNATIVE SPACER

ALTERNATIVE BOLTED GRATE

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION GRATE DETAILS

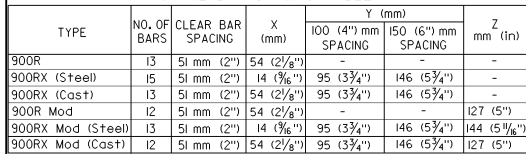
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NO SCALE

D77A

BASIS FOR MISC IRON & STEEL FINAL PAY MASSES FOR DRAINAGE INLETS

(See General Notes, No 8)



INLET TYPE	GRATE TYPE	NO. OF GRATES	MASS (WEIGHT) kg (LB)
ODI	900RX (Mod)	1	89 (196)
GMP, GCP, GCPI	900RX	1	98 (215)
ODI	900R (Mod)	1	100 (220)
GMP, GCP, GCPI	900R	1	107 (236)

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DIST.	COUNTY	ROUTE	KILOMETER TOTAL	POST PROJECT	SHEET NO.	TOTAL SHEET

Glenn DeCou
REGISTERED CIVIL ENGINEER

July 1, 2002
PLANS APPROVAL DATE

25 mm (1")

146 mm

REGISTERED PROFESSIONAL ENGINEER
Glenn DeCou
No. C34547
Exp. 9-30-03
17174
STATE OF CALIFORNIA

Type 450 Grate	Type 600 Grate
a=10 mm ($\frac{3}{8}$ "	a=22 mm ($\frac{7}{8}$ "
b=10 mm ($\frac{3}{8}$ "	b=19 mm ($\frac{3}{4}$ "

NOTE:
Mass of Type 600 grate = 70 kg. (155 lbs)
Mass of Type 450 grate = 59 kg. (130 lbs)
On Type 450 grate omit center bearing point.

BASIS FOR MISC IRON & STEEL FINAL PAY MASSES (WEIGHTS) FOR DRAINAGE INLETS			
INLET TYPE	GRATE TYPE	NO. GRATES	MASS (WEIGHT) (LBS)
G00 (SEE NOTE 4)	600-00C	2	177 (393)
	600-10S	2	207 (456)
	600-12X	2	215 (473)
	600-13	2	170 (374)
G0, G0L, G0, G2, G3, G4 (TYPE 600)	600-00C	1	92 (202)
	600-10S	1	104 (229)
	600-12X	1	108 (238)
G4 (TYPE 450) G5, G6	450-85	1	85 (189)
	450-90	1	85 (187)
	450-9X	1	85 (187)
	450-10	1	68 (449)
GT1, GT2	450-85	2	170 (374)
	450-9X	2	170 (374)
	450-10	2	135 (298)
GT3, GT4	600-00C	2	183 (404)
	600-10S	2	208 (458)
	600-12X	2	217 (478)
	600-13	2	171 (376)

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BICYCLE PROOF GRATE DETAILS

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NO SCALE

D77B

Diagram illustrating the OCP Inlet structure. The inlet is a semi-circular structure with a 900 mm (36") Nominal Dia. The opening at the bottom is 0.6 m (24") wide. Three circular components are shown at the bottom of the opening.

ELEVATION

16 mm ($\frac{5}{8}$ ") ϕ steel, Galv after fabrication. See Note 2.

Thread 65 mm ($2\frac{1}{2}$ ") for double nuts and washers (Galv)

Peen end of threads

6.4 mm ($\frac{1}{4}$ ") Checkered \bar{R} cover 1.1 m ($42"$) \pm Dia

75 mm ($3"$) \pm Wall

Dimensions:

- Overall height: 460 mm (18")
- Top section height: 480 mm (19")
- Section height: 200 mm (8")
- Section height: 150 mm (6")
- Section height: 30 mm (5")
- Section width: 150 mm (6")
- Section width: 150 mm (6")

Weld

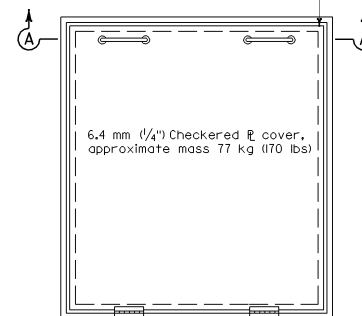
50 mm (2")

150 mm (6")

16 mm (5/8") Dia holes

Drop-handles
12 mm (1/2") Min Dia
steel, Galv

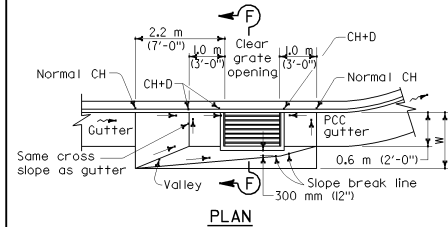
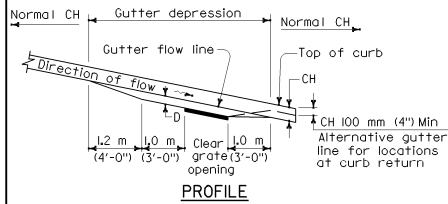
— Provide one brass flathead screw in each top corner of R cover.
Min size to be 9 mm x 12 mm ($\frac{3}{8}$ " x $\frac{1}{2}$ "), total 2.



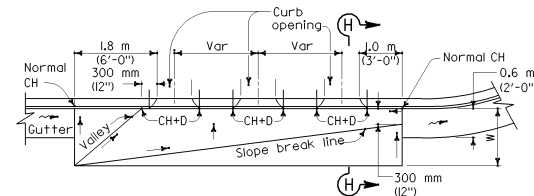
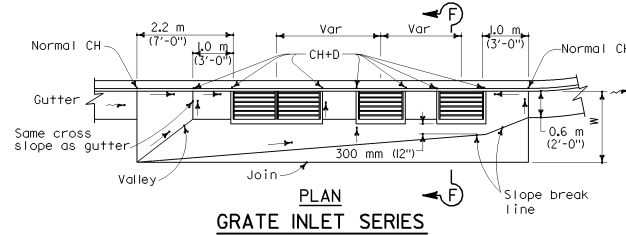
HINGED COVER FOR TYPE OL AND OS INLETS

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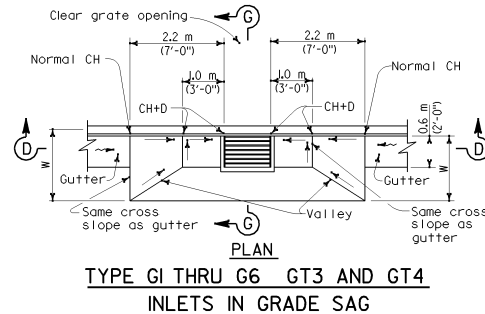
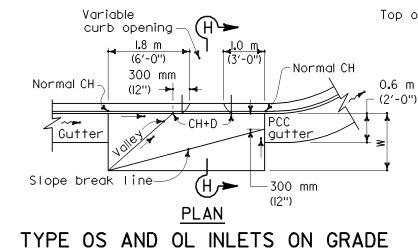
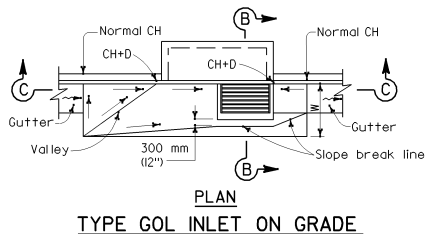
D77C



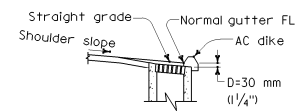
TYPE GO AND GI THRU G6 INLETS ON GRADE



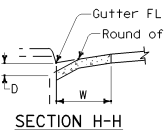
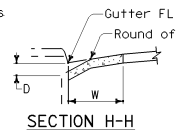
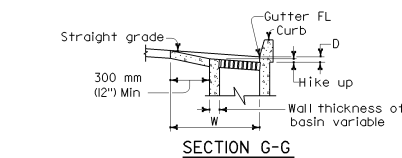
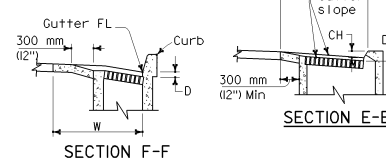
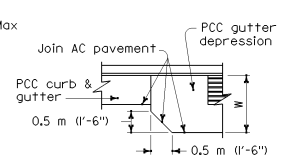
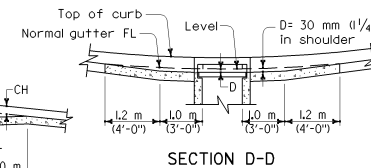
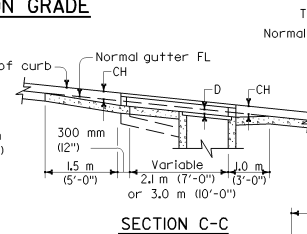
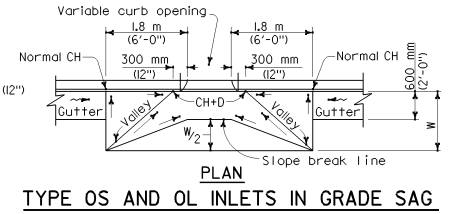
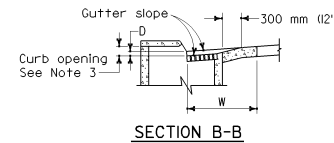
TYPE OS AND OL INLETS IN SERIES ON GRADE



TYPE GO AND GDO INLET GRADE SAG (GDO shown)



DETAIL OF INLET WITH DIKE (Single grate shown)



DETAIL OF ASPHALT CONCRETE PAVEMENT (See Note 4)

- NOTES:**
1. W = Width of depressed apron. Depressed aprons shall be 1.2 m (4'-0") on shoulder and 1.2 m (4'-0") to 1.8 m (6'-0") in city street gutters unless otherwise shown.
 2. Gutter depressions shall be 200 mm (8") thick.
 3. Establish curb opening height at midpoint of grate.
 4. Details shown for portland cement concrete pavement. When asphalt concrete pavement is used, corners to be cut off as shown on Detail of Asphalt Concrete Pavement.

- CH = Curb Height.
 → = Straight grade, downward slope.
 ~ = Gutter or shoulders direction of flow.

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GUTTER DEPRESSIONS

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NO SCALE

D78

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

July 1, 2002

PLANS APPROVAL DATE

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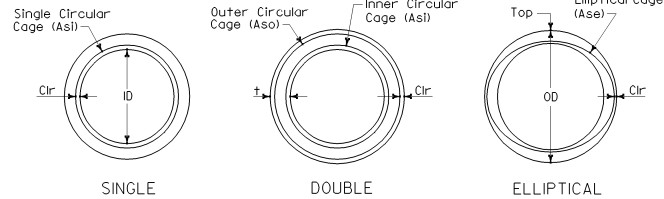
No. C24541

Exp. 9-30-03

STATE OF CALIFORNIA

CONSTRUCTION NOTES

- For details of the method of excavation, backfill and bedding (Method 1, Method 2, etc.), see Standard Plan A62D.
- The tables for minimum allowable classes and D-loads of RCP on Standard Plan A62D shall not apply to direct design RCP.
- Notes 3, 9 and 10 on Standard Plan A62D shall apply to direct design RCP.
- Throughout the length of any given culvert, the direct design selected by the Contractor shall be the same, including the method of excavation, backfill and bedding.
- The embankment height prior to excavation specified in note 5 of the Standard Plan A62D shall apply to the direct design RCP installation when Method 2, 3A or 3B are used.
- For single circular cage reinforcement, minimum clearance shall be 40% of the wall thickness (t). For elliptical and double circular cage reinforcement where the wall thickness (t) is less than 65 mm (2 1/2"), the minimum clearance (Clr) for reinforcement shall be 20 mm (3/4"), and where the wall thickness (t) is 65 mm (2 1/2") or more the minimum clearance (Clr) for reinforcement shall be 25 mm (1").
- Minimum cover measured at the edge of pavement shall be 600 mm (24") to top of AC pavement and 300 mm (12") to top of rigid pavement.



CAGE REINFORCEMENT

- t = Pipe barral wall thickness, mm (inches)
 Asi = Inner cage reinforcement, or single circular cage reinforcement, square mm/m (inches/LF)
 Aso = Outer cage reinforcement, square mm/m (square inches/LF)
- Ase = Elliptical single cage reinforcement, square mm/m (square inches/LF)
 ID = Inside Diameter, mm (inches)
 OD = Outside Diameter, mm (inches)
 Clr = Design clearance, mm (inches) (see Note 6)

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
Paul Cotter REGISTERED CIVIL ENGINEER No. C34509 July 1, 2002 PLANS APPROVAL DATE The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet. Caltrans now has a web site. To get to the web site, go to: https://www.dsd.ca.gov					

		MIN COVER TO 3 m (10') MAX COVER												WALL A												6 m (20') MAX COVER						12 m (40') MAX COVER					
ID	t	METHOD 1			METHOD 2			METHOD 3B			METHOD 1			METHOD 2			METHOD 3B			METHOD 1			METHOD 2			METHOD 3B			METHOD 3B								
		Asi	Aso	Ase	Asi	Aso	Ase	Asi	Aso	Ase	Asi	Aso	Ase	Asi	Aso	Ase	Asi	Aso	Ase	Asi	Aso	Ase	Asi	Aso	Ase	Asi	Aso	Ase									
600 mm (24")	63 mm (2 1/2")	360 (0.17)	---	---	280 (0.13)	---	---	210 (0.10)	---	---	470 (0.22)	---	---	300 (0.14)	---	---	210 (0.10)	---	---	---	---	---	420 (0.20)	---	---	---	---	---									
750 mm (30")	69 mm (2 3/4")	400 (0.19)	---	---	380 (0.18)	---	---	320 (0.15)	---	---	660 (0.31)	---	---	420 (0.20)	---	---	300 (0.14)	---	---	---	---	---	570 (0.27)	380 (0.18)	---	---	---	---									
900 mm (36")	75 mm (3")	450 (0.21)	280 (0.13)	490 (0.23)	440 (0.21)	280 (0.13)	440 (0.21)	360 (0.17)	250 (0.12)	360 (0.17)	780 (0.37)	400 (0.19)	800 (0.38)	530 (0.25)	340 (0.16)	550 (0.26)	340 (0.16)	210 (0.10)	340 (0.16)	700 (0.33)	470 (0.22)	740 (0.35)	510 (0.24)	---	---	---	---										
1050 mm (42")	88 mm (3 1/2")	530 (0.25)	320 (0.15)	590 (0.28)	490 (0.23)	320 (0.15)	490 (0.23)	380 (0.18)	280 (0.13)	380 (0.18)	850 (0.40)	440 (0.21)	950 (0.45)	570 (0.27)	360 (0.17)	590 (0.28)	360 (0.17)	230 (0.11)	380 (0.18)	740 (0.35)	510 (0.24)	800 (0.38)	550 (0.26)	---	---	---	---										
1200 mm (48")	100 mm (4")	660 (0.31)	380 (0.18)	680 (0.32)	510 (0.24)	340 (0.16)	530 (0.25)	400 (0.19)	280 (0.13)	400 (0.19)	950 (0.45)	490 (0.23)	1080 (0.51)	640 (0.30)	380 (0.18)	640 (0.30)	400 (0.19)	250 (0.12)	400 (0.19)	800 (0.38)	550 (0.26)	870 (0.41)	590 (0.28)	---	---	---	---										
1350 mm (54")	113 mm (4 1/2")	680 (0.32)	400 (0.19)	700 (0.33)	530 (0.25)	360 (0.17)	530 (0.25)	400 (0.19)	300 (0.14)	420 (0.20)	1040 (0.49)	530 (0.25)	1230 (0.58)	680 (0.32)	420 (0.20)	700 (0.33)	440 (0.21)	300 (0.14)	440 (0.21)	870 (0.41)	590 (0.28)	950 (0.45)	640 (0.30)	---	---	---	---										
1500 mm (60")	125 mm (5")	700 (0.33)	400 (0.19)	720 (0.34)	550 (0.26)	360 (0.17)	550 (0.26)	400 (0.19)	300 (0.14)	420 (0.20)	1140 (0.54)	570 (0.27)	1380 (0.65)	740 (0.35)	470 (0.22)	760 (0.36)	490 (0.23)	320 (0.15)	490 (0.23)	950 (0.45)	640 (0.30)	1040 (0.49)	680 (0.32)	---	---	---	---										
1650 mm (66")	138 mm (5 1/2")	720 (0.34)	420 (0.20)	740 (0.35)	550 (0.26)	360 (0.17)	570 (0.27)	420 (0.20)	300 (0.14)	440 (0.21)	1250 (0.59)	610 (0.29)	1500 (0.71)	800 (0.38)	510 (0.24)	830 (0.39)	530 (0.25)	340 (0.16)	530 (0.25)	1040 (0.49)	680 (0.32)	1120 (0.53)	720 (0.34)	---	---	---	---										
1800 mm (72")	150 mm (6")	740 (0.35)	420 (0.20)	760 (0.36)	550 (0.26)	360 (0.17)	570 (0.27)	400 (0.19)	300 (0.14)	420 (0.20)	1330 (0.63)	660 (0.31)	1630 (0.77)	870 (0.41)	550 (0.26)	890 (0.42)	550 (0.26)	360 (0.17)	570 (0.27)	1120 (0.53)	720 (0.34)	1290 (0.61)	830 (0.39)	---	---	---	---										
1950 mm (78")	163 mm (6 1/2")	760 (0.36)	420 (0.20)	780 (0.37)	570 (0.27)	380 (0.18)	590 (0.28)	420 (0.20)	300 (0.14)	440 (0.21)	1460 (0.69)	700 (0.33)	1900 (0.90)	930 (0.44)	590 (0.28)	950 (0.45)	590 (0.28)	400 (0.19)	610 (0.29)	1200 (0.57)	780 (0.37)	1400 (0.66)	890 (0.42)	---	---	---	---										
2100 mm (84")	175 mm (7")	800 (0.38)	440 (0.21)	830 (0.39)	590 (0.28)	380 (0.18)	610 (0.29)	420 (0.20)	300 (0.14)	550 (0.26)	1570 (0.74)	760 (0.36)	---	990 (0.47)	640 (0.30)	1040 (0.49)	660 (0.31)	420 (0.20)	680 (0.32)	1290 (0.61)	830 (0.39)	1500 (0.71)	950 (0.45)	---	---	---	---										
2250 mm (90")	188 mm (7 1/2")	850 (0.40)	470 (0.22)	870 (0.41)	640 (0.30)	400 (0.19)	660 (0.31)	440 (0.21)	300 (0.14)	610 (0.29)	---	---	---	1080 (0.51)	680 (0.32)	1140 (0.54)	700 (0.33)	470 (0.22)	720 (0.34)	1400 (0.66)	890 (0.42)	1600 (0.77)	1000 (0.48)	---	---	---	---										
2400 mm (96")	200 mm (8")	910 (0.43)	490 (0.23)	930 (0.44)	660 (0.31)	420 (0.20)	700 (0.33)	440 (0.21)	300 (0.14)	700 (0.33)	---	---	---	1140 (0.54)	720 (0.34)	1290 (0.61)	740 (0.35)	490 (0.23)	760 (0.36)	1500 (0.71)	950 (0.45)	1700 (0.81)	1100 (0.53)	---	---	---	---										
2550 mm (102")	213 mm (8 1/2")	970 (0.46)	530 (0.25)	990 (0.47)	720 (0.34)	470 (0.22)	800 (0.38)	490 (0.23)	320 (0.15)	800 (0.38)	---	---	---	1230 (0.58)	760 (0.36)	1480 (0.70)	800 (0.38)	530 (0.25)	830 (0.39)	1590 (0.75)	990 (0.47)	1800 (0.81)	1200 (0.57)	---	---	---	---										
2700 mm (108")	225 mm (9")	1040 (0.49)	570 (0.27)	1060 (0.50)	760 (0.36)	490 (0.23)	890 (0.42)	530 (0.25)	340 (0.16)	890 (0.42)	---	---	---	1310 (0.62)	830 (0.39)	1690 (0.80)	850 (0.40)	550 (0.26)	890 (0.42)	1690 (0.80)	1060 (0.50)	1900 (0.86)	1300 (0.61)	---	---	---	---										

		WALL AA	
		24 m (80') MAX COVER	
ID	t	Asi	Aso
600 mm (24")	144 mm (5 3/4")	280 (0.13)	150 (0.07)
750 mm (30")	150 mm (6")	400 (0.19)	150 (0.07)
900 mm (36")	163 mm (6 1/2")	510 (0.24)	150 (0.07)
1050 mm (42")	175 mm (7")	610 (0.29)	210 (0.10)
1200 mm (48")	188 mm (7 1/2")	720 (0.34)	280 (0.13)
1350 mm (54")	200 mm (8")	850 (0.40)	360 (0.17)
1500 mm (60")	213 mm (8 1/2")	990 (0.47)	440 (0.21)
1650 mm (66")	225 mm (9")	1100 (0.52)	530 (0.25)
1800 mm (72")	238 mm (9 1/2")	1210 (0.57)	590 (0.28)
1950 mm (78")	250 mm (10")	1330 (0.63)	680 (0.32)

DESIGN NOTES

Design: Bridge Design Specifications (1983) AASHTO with interims and revisions by Caltrans)

- A. Earth Loading:
 Earth Pressures - Vertical: 22.0 kPa/m (140 LB/CU FT)
 Horizontal: Varies, see design lateral pressure chart (Circular Pipe only)

- B. Unit Stresses: (Used in Design Tables)
 $f_y = 450 \text{ MPa}$ (65,000 psi)
 $f'_c = \text{See Tables}$

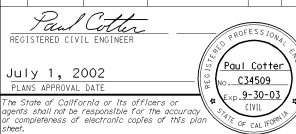
- C. The RCP as shown on this sheet is not intended to be used in a corrosive environment. A special design may be required.

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION PRECAST REINFORCED CONCRETE PIPE DIRECT DESIGN METHOD

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NO SCALE

D79A

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
					
July 1, 2002 PLANS APPROVAL DATE					
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		WALL B																	
		MIN COVER TO 3 m (10') MAX COVER														6 m (20') MAX COVER			
ID	†	METHOD 1			METHOD 2			METHOD 3B			METHOD 1			METHOD 2			METHOD 3B		
		Asl	Aso	Ase	Asl	Aso	Ase	Asl	Aso	Ase	Asl	Aso	Ase	Asl	Aso	Ase	Asl	Aso	Ase
600 mm (24")	75 mm (3")	250 (0.12)	---	---	210 (0.10)	---	---	190 (0.09)	---	---	380 (0.18)	---	---	250 (0.12)	---	---	190 (0.09)	---	---
750 mm (30")	88 mm (3 1/2")	400 (0.19)	---	---	300 (0.14)	---	---	250 (0.12)	---	---	530 (0.25)	---	---	340 (0.16)	---	---	230 (0.11)	---	---
900 mm (36")	100 mm (4")	380 (0.18)	190 (0.09)	380 (0.18)	280 (0.13)	170 (0.08)	300 (0.14)	230 (0.11)	150 (0.07)	230 (0.11)	490 (0.23)	230 (0.11)	590 (0.28)	340 (0.16)	190 (0.09)	340 (0.16)	230 (0.11)	150 (0.07)	230 (0.11)
1050 mm (42")	113 mm (4 1/2")	440 (0.21)	230 (0.11)	440 (0.21)	320 (0.15)	190 (0.09)	340 (0.16)	280 (0.13)	170 (0.08)	280 (0.13)	570 (0.27)	300 (0.14)	740 (0.35)	380 (0.18)	210 (0.10)	400 (0.19)	280 (0.13)	170 (0.08)	280 (0.13)
1200 mm (48")	125 mm (5")	510 (0.24)	280 (0.13)	510 (0.24)	380 (0.18)	230 (0.11)	380 (0.18)	300 (0.14)	190 (0.09)	320 (0.15)	660 (0.31)	340 (0.16)	910 (0.43)	440 (0.21)	250 (0.12)	470 (0.22)	320 (0.15)	190 (0.09)	320 (0.15)
1350 mm (54")	138 mm (5 1/2")	550 (0.26)	300 (0.14)	550 (0.26)	400 (0.19)	250 (0.12)	400 (0.19)	320 (0.15)	210 (0.10)	320 (0.15)	760 (0.36)	380 (0.18)	1060 (0.50)	510 (0.24)	300 (0.14)	510 (0.24)	360 (0.17)	210 (0.10)	380 (0.18)
1500 mm (60")	150 mm (6")	570 (0.27)	320 (0.15)	590 (0.28)	420 (0.20)	280 (0.13)	420 (0.20)	340 (0.16)	210 (0.10)	340 (0.16)	850 (0.40)	440 (0.21)	1270 (0.60)	570 (0.27)	340 (0.16)	570 (0.27)	400 (0.19)	230 (0.11)	420 (0.20)
1650 mm (66")	163 mm (6 1/2")	610 (0.29)	320 (0.15)	640 (0.30)	440 (0.21)	300 (0.14)	440 (0.21)	360 (0.17)	230 (0.11)	380 (0.18)	930 (0.44)	490 (0.23)	1550 (0.73)	640 (0.30)	380 (0.18)	640 (0.30)	440 (0.21)	300 (0.14)	440 (0.21)
1800 mm (72")	175 mm (7")	640 (0.30)	340 (0.16)	660 (0.31)	440 (0.21)	300 (0.14)	470 (0.22)	360 (0.17)	230 (0.11)	400 (0.19)	1100 (0.52)	550 (0.26)	1840 (0.87)	700 (0.33)	420 (0.20)	720 (0.34)	530 (0.25)	320 (0.15)	530 (0.25)
1950 mm (78")	188 mm (7 1/2")	660 (0.31)	360 (0.17)	680 (0.32)	470 (0.22)	320 (0.15)	510 (0.24)	380 (0.18)	250 (0.12)	470 (0.22)	1310 (0.62)	590 (0.28)	2140 (1.01)	760 (0.36)	470 (0.22)	780 (0.37)	550 (0.26)	340 (0.16)	570 (0.27)
2100 mm (84")	200 mm (8")	700 (0.33)	380 (0.18)	720 (0.34)	490 (0.23)	320 (0.15)	550 (0.26)	380 (0.18)	250 (0.12)	550 (0.26)	1480 (0.70)	640 (0.30)	---	830 (0.39)	510 (0.24)	870 (0.41)	590 (0.28)	360 (0.17)	610 (0.29)
2250 mm (90")	213 mm (8 1/2")	760 (0.36)	400 (0.19)	780 (0.37)	530 (0.25)	340 (0.16)	640 (0.30)	400 (0.19)	250 (0.12)	640 (0.30)	---	---	---	890 (0.42)	550 (0.26)	1040 (0.49)	640 (0.30)	380 (0.18)	660 (0.31)
2400 mm (96")	225 mm (9")	830 (0.39)	420 (0.20)	850 (0.40)	570 (0.27)	340 (0.16)	720 (0.34)	420 (0.20)	250 (0.12)	720 (0.34)	---	---	---	950 (0.45)	590 (0.28)	1160 (0.55)	680 (0.32)	420 (0.20)	720 (0.34)
2550 mm (102")	238 mm (9 1/2")	890 (0.42)	470 (0.22)	950 (0.45)	610 (0.29)	380 (0.18)	800 (0.38)	470 (0.22)	300 (0.14)	800 (0.38)	---	---	---	1040 (0.49)	660 (0.31)	1350 (0.64)	740 (0.35)	470 (0.22)	800 (0.38)
2700 mm (108")	250 mm (10")	950 (0.45)	510 (0.24)	1140 (0.54)	660 (0.31)	400 (0.19)	910 (0.43)	510 (0.24)	320 (0.15)	910 (0.43)	---	---	---	1100 (0.52)	680 (0.32)	1500 (0.71)	800 (0.38)	510 (0.24)	910 (0.43)

		WALL X																	
		MIN COVER TO 3 m (10') MAX COVER														3.1 m (10.1') TO 6 m (20') MAX COVER			
ID	†	METHOD 3B			METHOD 3C			METHOD 3B			METHOD 3C			METHOD 3B			METHOD 3C		
		Asl	Aso	Ase	Asl	Aso	Ase	Asl	Aso	Ase	Asl	Aso	Ase	Asl	Aso	Ase	Asl	Aso	Ase
600 mm (24")	47 mm (1 7/8")	280 (0.13)	---	---	250 (0.12)	---	---	250 (0.12)	---	---	210 (0.10)	---	---	380 (0.18)	---	---	320 (0.15)	---	---
750 mm (30")	53 mm (2 1/8")	380 (0.18)	---	---	360 (0.17)	---	---	320 (0.15)	---	---	250 (0.12)	---	---	490 (0.23)	---	---	400 (0.19)	---	---
900 mm (36")	59 mm (2 3/8")	400 (0.19)	320 (0.15)	400 (0.19)	380 (0.18)	280 (0.13)	380 (0.18)	360 (0.17)	---	---	300 (0.14)	---	---	250 (0.12)	440 (0.21)	320 (0.15)	450 (0.21)	---	---
1050 mm (42")	63 mm (2 1/2")	610 (0.29)	490 (0.23)	610 (0.29)	570 (0.27)	440 (0.21)	570 (0.27)	420 (0.20)	---	---	420 (0.20)	340 (0.16)	---	340 (0.16)	660 (0.31)	490 (0.23)	510 (0.24)	380 (0.18)	---
1200 mm (48")	69 mm (2 3/4")	660 (0.31)	510 (0.24)	660 (0.31)	590 (0.28)	470 (0.22)	610 (0.29)	530 (0.25)	---	---	490 (0.23)	420 (0.20)	---	380 (0.18)	740 (0.35)	550 (0.26)	590 (0.28)	440 (0.21)	---
1350 mm (54")	75 mm (2 7/8")	660 (0.31)	530 (0.25)	660 (0.31)	610 (0.29)	490 (0.23)	610 (0.29)	590 (0.28)	---	---	510 (0.24)	490 (0.23)	---	400 (0.19)	760 (0.36)	550 (0.26)	590 (0.28)	440 (0.21)	---
1500 mm (60")	88 mm (3 1/2")	610 (0.29)	490 (0.23)	640 (0.30)	570 (0.27)	440 (0.21)	590 (0.28)	680 (0.32)	---	---	530 (0.25)	550 (0.26)	---	420 (0.20)	780 (0.37)	570 (0.27)	610 (0.29)	470 (0.22)	---
1650 mm (66")	94 mm (3 3/4")	610 (0.29)	490 (0.23)	610 (0.29)	570 (0.27)	440 (0.21)	590 (0.28)	590 (0.28)	420 (0.20)	590 (0.28)	490 (0.23)	360 (0.17)	490 (0.23)	890 (0.42)	640 (0.30)	700 (0.33)	530 (0.25)	---	---
1800 mm (72")	105 mm (4 1/4")	570 (0.27)	440 (0.21)	570 (0.27)	530 (0.25)	400 (0.19)	550 (0.26)	590 (0.28)	420 (0.20)	590 (0.28)	490 (0.23)	340 (0.16)	490 (0.23)	870 (0.41)	610 (0.29)	700 (0.33)	510 (0.24)	---	---
1950 mm (78")	119 mm (4 3/4")	530 (0.25)	400 (0.19)	550 (0.26)	510 (0.24)	380 (0.18)	510 (0.24)	590 (0.28)	420 (0.20)	610 (0.29)	490 (0.23)	360 (0.17)	510 (0.24)	870 (0.41)	610 (0.29)	700 (0.33)	510 (0.24)	---	---
2100 mm (84")	132 mm (5 1/4")	530 (0.25)	400 (0.19)	570 (0.27)	490 (0.23)	360 (0.17)	530 (0.25)	610 (0.29)	440 (0.21)	640 (0.30)	510 (0.24)	360 (0.17)	530 (0.25)	890 (0.42)	640 (0.30)	720 (0.34)	510 (0.24)	---	---
2250 mm (90")	144 mm (5 3/4")	510 (0.24)	380 (0.18)	590 (0.28)	470 (0.22)	340 (0.16)	590 (0.28)	700 (0.33)	490 (0.23)	720 (0.34)	590 (0.28)	400 (0.19)	590 (0.28)	990 (0.47)	720 (0.34)	830 (0.39)	590 (0.28)	---	---
2400 mm (96")	150 mm (6")	510 (0.24)	380 (0.18)	680 (0.32)	490 (0.23)	340 (0.16)	680 (0.32)	720 (0.34)	510 (0.24)	740 (0.35)	590 (0.28)	420 (0.20)	680 (0.32)	990 (0.47)	720 (0.34)	830 (0.39)	590 (0.28)	---	---
2550 mm (102")	163 mm (6 1/2")	510 (0.24)	380 (0.18)	760 (0.36)	530 (0.25)	340 (0.16)	760 (0.36)	780 (0.37)	550 (0.26)	800 (0.38)	660 (0.31)	470 (0.22)	760 (0.36)	1120 (0.53)	780 (0.37)	910 (0.43)	660 (0.31)	---	---
2700 mm (108")	175 mm (7")	550 (0.26)	380 (0.18)	870 (0.41)	490 (0.23)	340 (0.16)	870 (0.41)	850 (0.40)	590 (0.28)	890 (0.42)	720 (0.34)	510 (0.24)	870 (0.41)	1250 (0.59)	850 (0.40)	990 (0.47)	720 (0.34)	---	---

		WALL BB	
		24 m (80') MAX COVER	
ID	†	METHOD 3C	
		Asl	Aso
600 mm (24")	163 mm (6 1/2")	230 (0.11)	150 (0.07)
750 mm (30")	175 mm (7")	340 (0.16)	150 (0.07)
900 mm (36")	188 mm (7 1/2")	440 (0.21)	150 (0.07)
1050 mm (42")	200 mm (8")	530 (0.25)	150 (0.07)
1200 mm (48")	213 mm (8 1/2")	660 (0.31)	190 (0.09)
1350 mm (54")	225 mm (9")	780 (0.37)	280 (0.13)
1500 mm (60")	238 mm (9 1/2")	870 (0.41)	340 (0.16)
1650 mm (66")	250 mm (10")	1140 (0.54)	420 (0.20)
f'c = 42 MPa (6,000 psi)	1800 mm (72")	265 mm (10 3/4")	1230 (0.58)
f'c = 49 MPa (7,000 psi)	1950 mm (78")	280 mm (11")	1310 (0.62)
f'c = 42 MPa (6,000 psi)	2100 mm (84")	290 mm (11 1/2")	1330 (0.63)
f'c = 49 MPa (7,000 psi)	2250 mm (90")	305 mm (12")	1440 (0.68)

- † = Pipe barrel wall thickness, mm (inches)
- Asl = Inner cage reinforcement, or single circular cage reinforcement, square mm/m (square inches/LF)
- Aso = Outer cage reinforcement, square mm/m (square inches/LF)
- Ase = Elliptical single cage reinforcement, square mm/m (square inches/LF)
- ID = Inside Diameter, mm (inches)
- OD = Outside Diameter, mm (inches)
- Clr = Design clearance, mm (inches) (see Note 6)

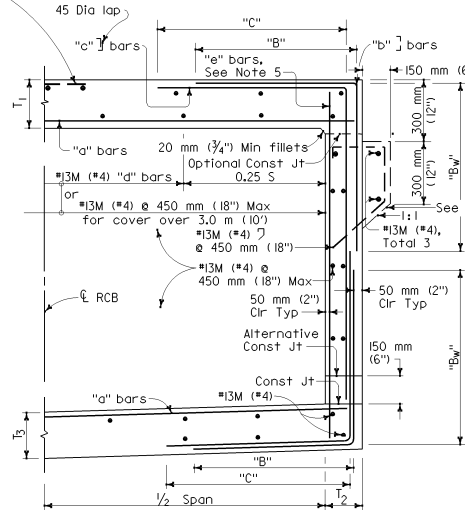
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

**PRECAST REINFORCED
CONCRETE PIPE
DIRECT DESIGN METHOD**

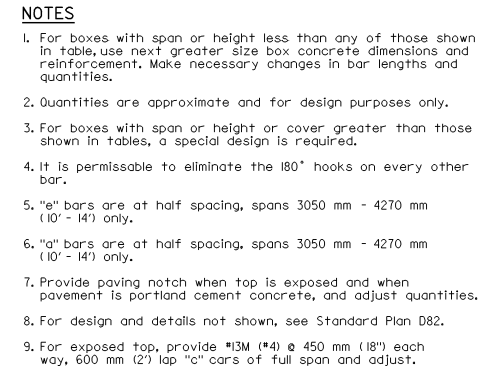
These "Standard Plans for Construction of Local Streets and Roads" contain units in two systems of measurement: International System of Units (SI or "metric") and United States Standard Measures shown in the parentheses (). The measurements expressed in the two systems are not necessarily equal or interchangeable. See the "Foreword" at the beginning of this publication.

NO SCALE

D79B



TYPICAL SECTION
SPANS 3050 mm THRU 4270 mm
(10' THRU 14')



These "Standard Plans for Construction of Local Streets and Roads" contain units in two systems of measurement: International System of Units (SI or "metric") and United States Standard Measures shown in the parentheses (). The measurements expressed in the two systems are not necessarily equal or interchangeable. See the "Foreword" at the beginning of this publication.

D80A

SPAN		1220 mm (4')						1520 mm (5')					
HEIGHT		610 mm (2')		915 mm (3')		1220 mm (4')		610 mm (2')		915 mm (3')		1220 mm (4')	
Conc	Maximum Earth Cover	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')
	Roof T ₁	180 mm (7")	180 mm (7")	180 mm (7")	180 mm (7")	180 mm (7")	180 mm (7")	190 mm (7 1/2")	190 mm (7 1/2")	190 mm (7 1/2")	190 mm (7 1/2")	190 mm (7 1/2")	190 mm (7 1/2")
	Walls T ₂	150 mm (6")	150 mm (6")	150 mm (6")	150 mm (6")	150 mm (6")	165 mm (6 1/2")	150 mm (6")	150 mm (6")	150 mm (6")	150 mm (6")	180 mm (7")	165 mm (6 1/2")
	Invert T ₃	150 mm (6")	150 mm (6")	150 mm (6")	150 mm (6")	150 mm (6")	165 mm (6 1/2")	165 mm (6 1/2")	180 mm (7")	165 mm (6 1/2")	180 mm (7")	165 mm (6 1/2")	180 mm (7")
Reinf	Spacing	175 mm (7")	175 mm (7")	175 mm (7")	175 mm (7")	175 mm (7")	175 mm (7")	215 mm (8 1/2")	150 mm (6")	215 mm (8 1/2")	140 mm (5 1/2")	215 mm (8 1/2")	140 mm (5 1/2")
	"a" Size Bar #	19M (#6)	19M (#6)	19M (#6)	19M (#6)	19M (#6)	19M (#6)	22M (#7)	19M (#6)	22M (#7)	19M (#6)	22M (#7)	19M (#6)
	"e" Size Bar #	13M (#4)	13M (#4)	13M (#4)	16M (#5)	16M (#5)	19M (#6)	13M (#4)	13M (#4)	16M (#5)	16M (#5)	19M (#6)	13M (#4)
Quantities	Concrete	0.69 m ³ /m (7.4 CF/LF)	0.69 m ³ /m (7.4 CF/LF)	0.78 m ³ /m (8.4 CF/LF)	0.78 m ³ /m (8.4 CF/LF)	0.87 m ³ /m (9.4 CF/LF)	0.84 m ³ /m (9.4 CF/LF)	0.83 m ³ /m (9.2 CF/LF)	0.85 m ³ /m (9.2 CF/LF)	0.93 m ³ /m (10.0 CF/LF)	0.95 m ³ /m (10.0 CF/LF)	1.02 m ³ /m (11.0 CF/LF)	1.11 m ³ /m (12.0 CF/LF)
	Reinforcement	71 kg/m (48 LB/LF)	71 kg/m (48 LB/LF)	74 kg/m (50 LB/LF)	82 kg/m (55 LB/LF)	86 kg/m (61 LB/LF)	100 kg/m (67 LB/LF)	86 kg/m (58 LB/LF)	89 kg/m (60 LB/LF)	86 kg/m (58 LB/LF)	101 kg/m (67 LB/LF)	100 kg/m (67 LB/LF)	121 kg/m (81 LB/LF)

SPAN		1830 mm (6')						2135 mm (7')					
HEIGHT		915 mm (3')		1220 mm (4')		1520 mm (5')		915 mm (3')		1220 mm (4')		1520 mm (5')	
Conc	Maximum Earth Cover	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')
	Roof T ₁	205 mm (8")	205 mm (8")	205 mm (8")	205 mm (8")	205 mm (8")	205 mm (8")	205 mm (8")	230 mm (9")	205 mm (8")	230 mm (9")	205 mm (8")	230 mm (9")
	Walls T ₂	150 mm (6")	150 mm (6")	150 mm (6")	180 mm (7")	165 mm (6 1/2")	190 mm (7 1/2")	150 mm (6")	150 mm (6")	150 mm (6")	180 mm (7")	165 mm (6 1/2")	190 mm (7 1/2")
	Invert T ₃	180 mm (7")	205 mm (8")	180 mm (7")	205 mm (8")	180 mm (7")	205 mm (8")	205 mm (8")	230 mm (9")	205 mm (8")	230 mm (9")	205 mm (8")	230 mm (9")
Reinf	Spacing	190 mm (7 1/2")	125 mm (5")	190 mm (7 1/2")	125 mm (5")	190 mm (7 1/2")	125 mm (5")	165 mm (6 1/2")	125 mm (5")	165 mm (6 1/2")	115 mm (4 1/2")	165 mm (6 1/2")	140 mm (5 1/2")
	"a" Size Bar #	22M (#7)	19M (#6)	22M (#7)	19M (#6)	22M (#7)	19M (#6)	22M (#7)	19M (#6)	22M (#7)	19M (#6)	22M (#7)	22M (#7)
	"e" Size Bar #	13M (#4)	13M (#4)	16M (#5)	16M (#5)	19M (#6)	19M (#6)	13M (#4)	13M (#4)	16M (#5)	16M (#5)	19M (#6)	19M (#6)
Quantities	Concrete	1.09 m ³ /m (11.7 CF/LF)	1.14 m ³ /m (12.3 CF/LF)	1.18 m ³ /m (12.7 CF/LF)	1.32 m ³ /m (14.2 CF/LF)	1.48 m ³ /m (15.9 CF/LF)	1.48 m ³ /m (15.9 CF/LF)	1.27 m ³ /m (13.7 CF/LF)	1.38 m ³ /m (14.9 CF/LF)	1.36 m ³ /m (14.6 CF/LF)	1.56 m ³ /m (16.8 CF/LF)	1.50 m ³ /m (16.1 CF/LF)	1.72 m ³ /m (18.5 CF/LF)
	Reinforcement	104 kg/m (70 LB/LF)	121 kg/m (81 LB/LF)	122 kg/m (82 LB/LF)	143 kg/m (96 LB/LF)	144 kg/m (97 LB/LF)	179 kg/m (120 LB/LF)	185 kg/m (124 LB/LF)	220 kg/m (148 LB/LF)	140 kg/m (94 LB/LF)	140 kg/m (94 LB/LF)	156 kg/m (105 LB/LF)	176 kg/m (118 LB/LF)

SPAN		2440 mm (8')					
HEIGHT		1220 mm (4')		1520 mm (5')		1830 mm (6')	
Conc	Maximum Earth Cover	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')
	Roof T ₁	215 mm (8 1/2")	240 mm (9 1/2")	215 mm (8 1/2")	240 mm (9 1/2")	215 mm (8 1/2")	255 mm (10")
	Walls T ₂	150 mm (6")	180 mm (7")	165 mm (6 1/2")	190 mm (7 1/2")	180 mm (7")	215 mm (8 1/2")
	Invert T ₃	205 mm (8")	240 mm (9 1/2")	205 mm (8")	255 mm (10")	205 mm (8")	255 mm (10")
Reinf	Spacing	150 mm (6")	125 mm (5")	150 mm (6")	125 mm (5")	150 mm (6")	115 mm (4 1/2")
	"a" Size Bar #	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)
	"e" Size Bar #	16M (#5)	16M (#5)	16M (#5)	19M (#6)	19M (#6)	19M (#6)
Quantities	Concrete	1.52 m ³ /m (16.4 CF/LF)	1.77 m ³ /m (19.0 CF/LF)	1.66 m ³ /m (17.9 CF/LF)	1.96 m ³ /m (21.0 CF/LF)	1.81 m ³ /m (19.5 CF/LF)	2.24 m ³ /m (24.1 CF/LF)
	Reinforcement	183 kg/m (123 LB/LF)	225 kg/m (151 LB/LF)	195 kg/m (131 LB/LF)	254 kg/m (171 LB/LF)	204 kg/m (137 LB/LF)	295 kg/m (198 LB/LF)

- See Note 5, on Standard Plan D80A.
 •• See Note 6, on Standard Plan D80A.

"d" bars, for earth covers up to and including 3.0 m (10')								
Span	1220 mm (4')	1520 mm (5')	1830 mm (6')	2135 mm (7')	2440 mm (8')	3050 mm (10')	3660 mm (12')	4270 mm (14')
Number	7	8	9	10	11	12	15	20

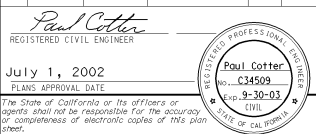
STATE OF CALIFORNIA
 DEPARTMENT OF TRANSPORTATION
**CAST-IN-PLACE
 REINFORCED CONCRETE
 SINGLE BOX CULVERT**

These "Standard Plans for Construction of Local Streets and Roads" contain units in two systems of measurement: International System of Units (SI or "metric") and United States Standard Measures shown in the parentheses (). The measurements expressed in the two systems are not necessarily equal or interchangeable. See the "Foreword" at the beginning of this publication.

NO SCALE

D80B

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
<div style="display: flex; justify-content: space-between;"> <div> <p><i>Paul Cotter</i> REGISTERED CIVIL ENGINEER</p> <p>July 1, 2002 PLANS APPROVAL DATE</p> <p><small>The State of California or its officers or agents shall not be responsible for the accuracy or completeness or electronic copies of this plan sheet.</small></p> <p><small>Cotters now has a web site! To get to the web site, go to http://www.dot.ca.gov</small></p> </div> <div style="border: 1px solid black; border-radius: 50%; padding: 10px; text-align: center;"> <p>REGISTERED PROFESSIONAL ENGINEER</p> <p><i>Paul Cotter</i> No. C3509 Exp. 9-30-03 STATE OF CALIFORNIA</p> </div> </div>					

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
					
July 1, 2002 PLANS APPROVAL DATE The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet. Caltrans now has a web site! To get to the web site, go to http://www.dot.ca.gov					

SPAN		3050 mm (10')											
HEIGHT		1520 mm (5')		1830 mm (6')		2135 mm (7')		2440 mm (8')		2745 mm (9')		3050 mm (10')	
Maximum Earth Cover		3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')
Conc	Roof T ₁	205 mm (8")	270 mm (10 1/2")	205 mm (8")	270 mm (10 1/2")	205 mm (8")	270 mm (10 1/2")	205 mm (8")	270 mm (10 1/2")	205 mm (8")	270 mm (10 1/2")	215 mm (8 1/2")	280 mm (11")
	Walls T ₂	205 mm (8")	205 mm (8")	205 mm (8")	230 mm (9")	205 mm (8")	230 mm (9")	205 mm (8")	255 mm (10")	215 mm (8 1/2")	290 mm (11 1/2")	240 mm (9 1/2")	320 mm (12 1/2")
	Invert T ₃	205 mm (8")	280 mm (11")	205 mm (8")	280 mm (11")	205 mm (8")	280 mm (11")	205 mm (8")	280 mm (11")	205 mm (8")	280 mm (11")	215 mm (8 1/2")	280 mm (11")
Reinf	Spacing	325 mm (13")	300 mm (12")	300 mm (12")	300 mm (12")	275 mm (11")	275 mm (11")	250 mm (10")	275 mm (11")	275 mm (11")	250 mm (10")	275 mm (11")	250 mm (10")
	• "a" Size Bar #	19M (#6)	22M (#7)	19M (#6)	22M (#7)	19M (#6)	22M (#7)	19M (#6)	22M (#7)	19M (#6)	19M (#6)	19M (#6)	19M (#6)
	Size Bar #	19M (#6)	22M (#7)	19M (#6)	22M (#7)	19M (#6)	22M (#7)	19M (#6)	22M (#7)	19M (#6)	19M (#6)	22M (#7)	22M (#7)
	• "b" Dimension "B"	900 mm (2'-11")	900 mm (2'-11")	900 mm (2'-11")	925 mm (3'-0")	900 mm (2'-11")	925 mm (3'-0")	900 mm (2'-11")	925 mm (3'-0")	900 mm (2'-11")	925 mm (3'-0")	900 mm (2'-11")	925 mm (3'-0")
	Dimension "B _w "	1475 mm (4'-10")	1525 mm (5'-0")	1475 mm (4'-10")	1525 mm (5'-0")	1475 mm (4'-10")	1525 mm (5'-0")	1475 mm (4'-10")	1525 mm (5'-0")	1475 mm (4'-10")	1525 mm (5'-0")	1400 mm (4'-7")	1400 mm (4'-7")
	Size Bar #	19M (#6)	22M (#7)	19M (#6)	22M (#7)	19M (#6)	22M (#7)	19M (#6)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)
	• "c" Dimension "C"	1025 mm (3'-4")	1025 mm (3'-4")	2250 mm (7'-4")	1425 mm (4'-8")	2325 mm (7'-7")	1425 mm (4'-8")	2500 mm (8'-2")	1425 mm (4'-8")	2325 mm (7'-7")	1425 mm (4'-8")	2325 mm (7'-7")	1425 mm (4'-8")
Quantities	• "e" Size Bar #	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	16M (#5)	16M (#5)
	Concrete	2.01 m ³ /m (26.8 CF/LF)	2.50 m ³ /m (37.7 CF/LF)	2.14 m ³ /m (29.3 CF/LF)	2.74 m ³ /m (40.1 CF/LF)	2.26 m ³ /m (30.3 CF/LF)	2.88 m ³ /m (41.9 CF/LF)	2.38 m ³ /m (32.2 CF/LF)	3.17 m ³ /m (45.4 CF/LF)	2.58 m ³ /m (34.5 CF/LF)	3.50 m ³ /m (49.8 CF/LF)	2.98 m ³ /m (40.7 CF/LF)	3.93 m ³ /m (54.2 CF/LF)
Reinforcement		284 kg/m (191 LB/LF)	397 kg/m (267 LB/LF)	347 kg/m (233 LB/LF)	424 kg/m (285 LB/LF)	387 kg/m (260 LB/LF)	484 kg/m (325 LB/LF)	446 kg/m (300 LB/LF)	504 kg/m (339 LB/LF)	467 kg/m (314 LB/LF)	487 kg/m (327 LB/LF)	536 kg/m (360 LB/LF)	555 kg/m (373 LB/LF)

SPAN		3660 mm (12')				3660 mm (12')				3660 mm (12')			
HEIGHT		1830 mm (6')		2135 mm (7')		2440 mm (8')		2745 mm (9')		3050 mm (10')		3350 mm (11')	
Maximum Earth Cover		3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')
Conc	Roof T ₁	215 mm (8 1/2")	305 mm (12")	215 mm (8 1/2")	305 mm (12")	215 mm (8 1/2")	305 mm (12")	215 mm (8 1/2")	305 mm (12")	215 mm (8 1/2")	305 mm (12")	240 mm (9 1/2")	305 mm (12")
	Walls T ₂	205 mm (8")	255 mm (10 1/2")	215 mm (8 1/2")	270 mm (10 1/2")	215 mm (8 1/2")	270 mm (10 1/2")	215 mm (8 1/2")	290 mm (11 1/2")	230 mm (9")	320 mm (12 1/2")	270 mm (10 1/2")	345 mm (13 1/2")
	Invert T ₃	215 mm (8 1/2")	320 mm (12 1/2")	230 mm (9")	320 mm (12 1/2")	230 mm (9")	320 mm (12 1/2")	230 mm (9")	320 mm (12 1/2")	230 mm (9")	320 mm (12 1/2")	240 mm (9")	330 mm (13")
Reinf	Spacing	225 mm (9")	250 mm (10")	225 mm (9")	250 mm (10")	225 mm (9")	250 mm (10")	200 mm (8")	250 mm (10")	200 mm (8")	250 mm (10")	250 mm (10")	225 mm (9")
	• "a" Size Bar #	19M (#6)	22M (#7)	19M (#6)	22M (#7)	19M (#6)	22M (#7)	19M (#6)	22M (#7)	19M (#6)	22M (#7)	19M (#6)	19M (#6)
	Size Bar #	19M (#6)	22M (#7)	19M (#6)	22M (#7)	19M (#6)	22M (#7)	19M (#6)	22M (#7)	19M (#6)	22M (#7)	19M (#6)	22M (#7)
	• "b" Dimension "B"	950 mm (3'-1")	975 mm (3'-2")	1150 mm (3'-9")	1150 mm (3'-9")	1150 mm (3'-9")	1150 mm (3'-9")	1100 mm (3'-7")	1150 mm (3'-9")	1100 mm (3'-7")	1325 mm (4'-4")	1100 mm (3'-7")	1325 mm (4'-4")
	Dimension "B _w "	1850 mm (6'-1")	1800 mm (5'-10")	1900 mm (6'-2")	2025 mm (6'-7")	1900 mm (6'-2")	2025 mm (6'-7")	1500 mm (4'-11")	1500 mm (4'-11")	1500 mm (4'-11")	1500 mm (4'-11")	1500 mm (4'-11")	1500 mm (4'-11")
	Size Bar #	19M (#6)	22M (#7)	19M (#6)	22M (#7)	19M (#6)	22M (#7)	19M (#6)	22M (#7)	19M (#6)	22M (#7)	22M (#7)	22M (#7)
	• "c" Dimension "C"	1325 mm (4'-4")	1100 mm (3'-7")	2475 mm (8'-1")	1700 mm (5'-7")	2475 mm (8'-1")	1700 mm (5'-7")	2475 mm (8'-1")	1700 mm (5'-7")	2475 mm (8'-1")	1700 mm (5'-7")	2475 mm (8'-1")	1700 mm (5'-7")
Quantities	• "e" Size Bar #	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	16M (#5)	16M (#5)
	Concrete	2.49 m ³ /m (26.8 CF/LF)	3.50 m ³ /m (37.7 CF/LF)	2.72 m ³ /m (29.3 CF/LF)	3.73 m ³ /m (40.1 CF/LF)	2.81 m ³ /m (30.3 CF/LF)	3.89 m ³ /m (41.9 CF/LF)	3.00 m ³ /m (32.2 CF/LF)	4.22 m ³ /m (45.4 CF/LF)	3.21 m ³ /m (34.5 CF/LF)	4.63 m ³ /m (49.8 CF/LF)	3.78 m ³ /m (40.7 CF/LF)	5.56 m ³ /m (54.2 CF/LF)
Reinforcement		439 kg/m (295 LB/LF)	539 kg/m (362 LB/LF)	525 kg/m (353 LB/LF)	609 kg/m (409 LB/LF)	543 kg/m (365 LB/LF)	625 kg/m (420 LB/LF)	598 kg/m (402 LB/LF)	615 kg/m (413 LB/LF)	631 kg/m (415 LB/LF)	655 kg/m (424 LB/LF)	701 kg/m (440 LB/LF)	795 kg/m (468 LB/LF)

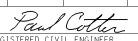
- See Note 5, on Standard Plan D80A.
- See Note 6, on Standard Plan D80A.


STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**CAST-IN-PLACE
REINFORCED CONCRETE
SINGLE BOX CULVERT**

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NO SCALE

D80C

DIST	COUNTY	ROUTE	KILOMETER TOTAL PROJECT	POST NO.	SHEET NO.	TOTAL SHEETS
 REGISTERED CIVIL ENGINEER						
July 1, 2002 PLANS APPROVAL DATE						
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SPAN		4270 mm (14')															
HEIGHT		2135 mm (7')		2440 mm (8')		2745 mm (9')		3050 mm (10')		3350 mm (11')		3660 mm (12')		3960 mm (13')		4270 mm (14')	
Maximum Earth Cover		3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')
Conc	Roof T ₁	240 mm (9 1/2")	355 mm (14")	240 mm (9 1/2")	355 mm (14")	240 mm (9 1/2")	355 mm (14")	240 mm (9 1/2")	355 mm (14")	255 mm (10")	355 mm (14")	255 mm (10")	355 mm (14")	270 mm (10 1/2")	355 mm (14")	280 mm (11")	355 mm (14")
	Walls T ₂	240 mm (9 1/2")	280 mm (11")	240 mm (9 1/2")	290 mm (11 1/2")	240 mm (9 1/2")	290 mm (11 1/2")	255 mm (10")	320 mm (12 1/2")	270 mm (10 1/2")	355 mm (14")	290 mm (11 1/2")	380 mm (15")	320 mm (12 1/2")	420 mm (16 1/2")	345 mm (13 1/2")	445 mm (17 1/2")
	Invert T ₃	255 mm (10")	370 mm (14 1/2")	255 mm (10")	370 mm (14 1/2")	255 mm (10")	370 mm (14 1/2")	255 mm (10")	370 mm (14 1/2")	270 mm (10 1/2")	370 mm (14 1/2")	270 mm (10 1/2")	380 mm (15")	280 mm (11")	380 mm (15")	290 mm (11 1/2")	380 mm (15")
Reinf	Spacing	250 mm (10")	255 mm (9")	250 mm (10")	225 mm (9")	250 mm (10")	200 mm (8")	250 mm (10")	200 mm (8")	250 mm (10")	200 mm (8")	200 mm (8")	250 mm (10")	250 mm (10")	250 mm (10")	250 mm (10")	225 mm (9")
	•• "a" Size Bar •	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	19M (#6)	22M (#7)	19M (#6)	22M (#7)	19M (#6)	22M (#7)
	•• "a" Size Bar •	19M (#6)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	19M (#6)	25M (#8)	22M (#7)	25M (#8)	22M (#7)	25M (#8)
	"b" Dimension "B"	850 mm (2'-9")	1275 mm (4'-2")	1025 mm (3'-4")	1325 mm (4'-4")	1025 mm (3'-4")	1375 mm (4'-6")	1025 mm (3'-4")	1375 mm (4'-6")	1075 mm (3'-6")	1375 mm (4'-6")	1075 mm (3'-6")	1375 mm (4'-6")	1075 mm (3'-6")	1450 mm (4'-9")	1850 mm (6'-0")	1850 mm (6'-0")
	"b" Dimension "B _w "	1975 mm (6'-5")	2150 mm (7'-0")	2150 mm (7'-0")	2550 mm (8'-4")	2150 mm (7'-0")	2550 mm (8'-4")	1850 mm (6'-0")	1850 mm (6'-0")	1850 mm (6'-0")	1850 mm (6'-0")	1850 mm (6'-0")	1850 mm (6'-0")	1525 mm (5'-0")	1850 mm (6'-0")	1375 mm (4'-6")	1850 mm (6'-0")
	"c" Size Bar •	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	25M (#8)	25M (#8)	25M (#8)	25M (#8)
	"c" Dimension "C"	1225 mm (4'-0")	1275 mm (4'-2")	2075 mm (6'-9")	2075 mm (6'-9")	1800 mm (5'-10")	1800 mm (5'-10")	1850 mm (6'-0")	1950 mm (6'-4")	2725 mm (8'-11")	1950 mm (6'-4")	2725 mm (8'-11")	1950 mm (6'-4")	2725 mm (8'-11")	1950 mm (6'-4")	2725 mm (8'-11")	1950 mm (6'-4")
Quantities	• "e" Size Bar •	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	16M (#5)	19M (#6)	19M (#6)	19M (#6)	19M (#6)
	Concrete	3.36 m ³ /m (36.2 CF/LF)	4.73 m ³ /m (51.0 CF/LF)	3.51 m ³ /m (37.8 CF/LF)	4.93 m ³ /m (53.1 CF/LF)	3.67 m ³ /m (39.5 CF/LF)	5.40 m ³ /m (58.7 CF/LF)	3.89 m ³ /m (41.9 CF/LF)	5.45 m ³ /m (58.7 CF/LF)	4.26 m ³ /m (45.9 CF/LF)	5.95 m ³ /m (64.1 CF/LF)	4.64 m ³ /m (49.9 CF/LF)	6.46 m ³ /m (69.5 CF/LF)	5.17 m ³ /m (55.6 CF/LF)	7.04 m ³ /m (75.8 CF/LF)	5.72 m ³ /m (61.6 CF/LF)	7.55 m ³ /m (81.3 CF/LF)
Reinforcement		557 kg/m (374 LB/LF)	701 kg/m (471 LB/LF)	668 kg/m (449 LB/LF)	777 kg/m (522 LB/LF)	663 kg/m (446 LB/LF)	874 kg/m (587 LB/LF)	668 kg/m (449 LB/LF)	863 kg/m (580 LB/LF)	732 kg/m (492 LB/LF)	887 kg/m (596 LB/LF)	799 kg/m (537 LB/LF)	900 kg/m (605 LB/LF)	839 kg/m (564 LB/LF)	943 kg/m (634 LB/LF)	899 kg/m (604 LB/LF)	1130 kg/m (759 LB/LF)

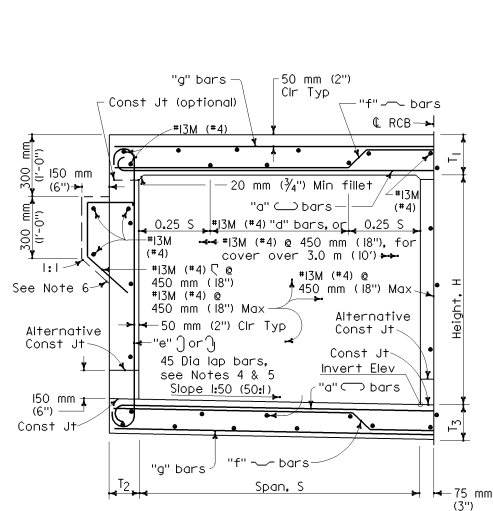
- See Note 5, on Standard Plan D80A.
- See Note 6, on Standard Plan D80A.

STATE OF CALIFORNIA
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**CAST-IN-PLACE
REINFORCED CONCRETE
SINGLE BOX CULVERT**

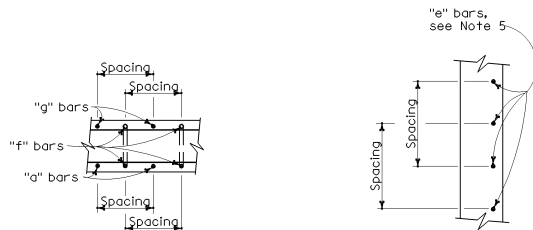
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NO SCALE

D80D

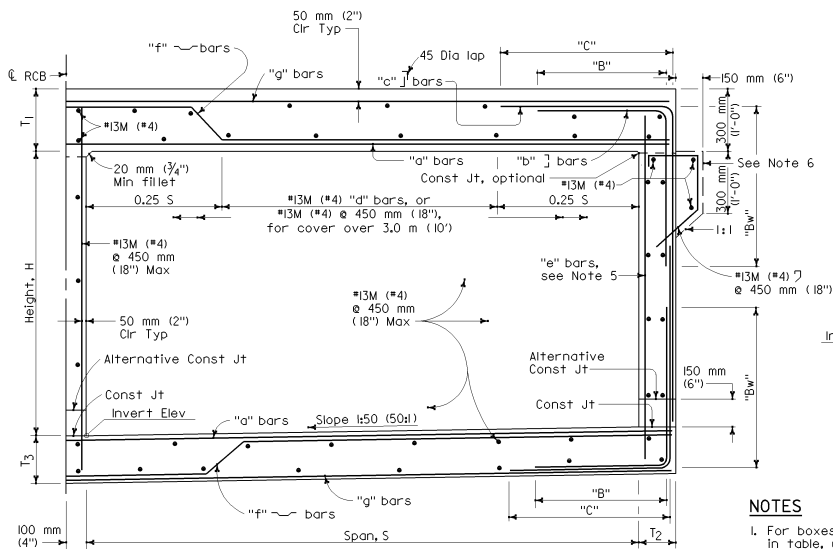


TYPICAL SECTION SPANS
1220 mm THRU 2440 mm
(4' THRU 8')

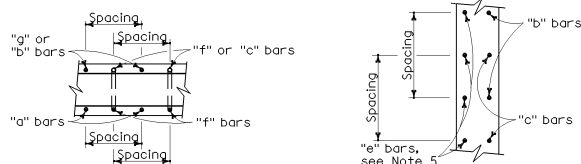


ROOF SECTION SPANS
1220 mm THRU 2440 mm
(4' THRU 8')
 Invert Similar

EXTERIOR WALL SECTION SPANS
1220 mm THRU 2440 mm
(4' THRU 8')



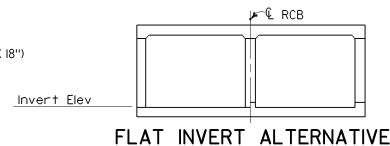
TYPICAL SECTION SPANS
3050 mm THRU 4270 mm
(10' THRU 14')



ROOF SECTION SPANS
3050 mm THRU 4270 mm
(10' THRU 14')
 Invert Similar

EXTERIOR WALL SECTION SPANS
3050 mm THRU 4270 mm
(10' THRU 14')

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
Paul Cotter REGISTERED CIVIL ENGINEER July 1, 2002 PLANS APPROVAL DATE No. C34502 Exp. 9-30-03 STATE OF CALIFORNIA The State of California or its officers or agents shall not be responsible for the accuracy or completeness or electronic copies of this plan sheet. Caltrans now has a web site! To get to the web site, go to http://www.dot.ca.gov					



FLAT INVERT ALTERNATIVE

NOTES

- For boxes with span or height less than any of those shown in table, use next greater size box concrete dimensions and reinforcement. Make necessary changes in bar lengths and quantities.
- For boxes with span or height or cover greater than those shown in tables, a special design is required.
- Quantities are approximate and for design purposes only.
- It is permissible to eliminate the 180° hooks on every other "e" bar.
- "e" bars are at half spacing.
- Provide paving notch when top is exposed and when pavement is portland cement concrete, and adjust quantities.
- For design and details not shown, see Standard Plan D82.
- This plan sheet may be used for multiple cell culverts by making necessary adjustments.

STATE OF CALIFORNIA
 DEPARTMENT OF TRANSPORTATION
**CAST-IN-PLACE
 REINFORCED CONCRETE
 DOUBLE BOX CULVERT**

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NO SCALE

D81A

SPAN		1220 mm (4')						1520 mm (5')					
HEIGHT		610 mm (2')		915 mm (3')		1220 mm (4')		610 mm (2')		915 mm (3')		1220 mm (4')	
Maximum Earth Cover		3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')
Conc	Roof T ₁	180 mm (7")	180 mm (7")	180 mm (7")	180 mm (7")	180 mm (7")	180 mm (7")	180 mm (7")	190 mm (7½")	180 mm (7")	190 mm (7½")	180 mm (7")	190 mm (7½")
	Walls T ₂	150 mm (6")	150 mm (6")	150 mm (6")	150 mm (6")	150 mm (6")	150 mm (6")	150 mm (6")	150 mm (6")	150 mm (6")	150 mm (6")	180 mm (7")	165 mm (7½")
	Invert T ₃	180 mm (7")	180 mm (7")	180 mm (7")	180 mm (7")	180 mm (7")	180 mm (7")	180 mm (7")	205 mm (8")	180 mm (7")	205 mm (8")	180 mm (7")	205 mm (8")
Reinf	Spacing	400 mm (16")	375 mm (15")	400 mm (16")	375 mm (15")	400 mm (16")	375 mm (15")	290 mm (11½")	350 mm (14")	290 mm (11½")	350 mm (14")	290 mm (11½")	380 mm (15")
	"g" Size Bar ■	13M (#4)	22M (#7)	13M (#4)	22M (#7)	13M (#4)	22M (#7)	13M (#4)	22M (#7)	13M (#4)	22M (#7)	13M (#4)	22M (#7)
	"f" Size Bar ■	16M (#5)	16M (#5)	16M (#5)	16M (#5)	16M (#5)	16M (#5)	16M (#5)	16M (#5)	16M (#5)	16M (#5)	16M (#5)	16M (#5)
	"a" Size Bar ■	19M (#6)	13M (#4)	19M (#6)	13M (#4)	19M (#6)	13M (#4)	19M (#6)	13M (#4)	19M (#6)	13M (#4)	19M (#6)	13M (#4)
	"e" Size Bar ■	13M (#4)	13M (#4)	13M (#4)	16M (#5)	16M (#5)	19M (#6)	13M (#4)	13M (#4)	16M (#5)	16M (#5)	19M (#6)	22M (#7)
Quantities	Concrete	1.30 m ³ /m (14.0 CF/LF)	1.30 m ³ /m (14.0 CF/LF)	1.44 m ³ /m (15.5 CF/LF)	1.44 m ³ /m (15.5 CF/LF)	1.58 m ³ /m (17.0 CF/LF)	1.65 m ³ /m (17.8 CF/LF)	1.51 m ³ /m (16.5 CF/LF)	1.65 m ³ /m (17.8 CF/LF)	1.65 m ³ /m (17.8 CF/LF)	1.79 m ³ /m (19.3 CF/LF)	2.00 m ³ /m (21.6 CF/LF)	1.98 m ³ /m (21.3 CF/LF)
	Reinforcement	116 kg/m (78 LB/LF)	132 kg/m (89 LB/LF)	125 kg/m (84 LB/LF)	141 kg/m (95 LB/LF)	138 kg/m (93 LB/LF)	167 kg/m (112 LB/LF)	177 kg/m (119 LB/LF)	167 kg/m (112 LB/LF)	182 kg/m (122 LB/LF)	180 kg/m (122 LB/LF)	199 kg/m (134 LB/LF)	204 kg/m (137 LB/LF)

SPAN		1830 mm (6')						2135 mm (7')					
HEIGHT		915 mm (3')		1220 mm (4')		1520 mm (5')		915 mm (3')		1220 mm (4')		1520 mm (5')	
Maximum Earth Cover		3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')
Conc	Roof T ₁	180 mm (7")	230 mm (9")	180 mm (7")	230 mm (9")	180 mm (7")	230 mm (9")	190 mm (7½")	255 mm (10")	190 mm (7½")	255 mm (10")	190 mm (7½")	255 mm (10")
	Walls T ₂	150 mm (6")	150 mm (6")	150 mm (6")	180 mm (7")	165 mm (6½")	205 mm (8")	150 mm (6")	150 mm (6")	150 mm (6")	180 mm (7")	165 mm (6½")	205 mm (8")
	Invert T ₃	180 mm (7")	230 mm (9")	180 mm (7")	230 mm (9")	180 mm (7")	230 mm (9")	190 mm (7½")	270 mm (10½")	190 mm (7½")	270 mm (10½")	190 mm (7½")	270 mm (10½")
Reinf	Spacing	290 mm (11½")	300 mm (12")	290 mm (11½")	300 mm (12")	290 mm (11½")	300 mm (12")	275 mm (11")	265 mm (10½")	275 mm (11")	265 mm (10½")	275 mm (11")	265 mm (10½")
	"g" Size Bar ■	19M (#6)	22M (#7)	19M (#6)	22M (#7)	19M (#6)	22M (#7)	19M (#6)	22M (#7)	19M (#6)	22M (#7)	19M (#6)	22M (#7)
	"f" Size Bar ■	16M (#5)	16M (#5)	16M (#5)	16M (#5)	16M (#5)	16M (#5)	16M (#5)	16M (#5)	16M (#5)	16M (#5)	16M (#5)	16M (#5)
	"a" Size Bar ■	22M (#7)	13M (#4)	22M (#7)	13M (#4)	22M (#7)	13M (#4)	19M (#6)	13M (#4)	19M (#6)	13M (#4)	19M (#6)	13M (#4)
	"e" Size Bar ■	13M (#4)	16M (#5)	13M (#4)	19M (#6)	16M (#5)	19M (#6)	13M (#4)	16M (#5)	16M (#5)	16M (#5)	13M (#4)	19M (#6)
Quantities	Concrete	1.87 m ³ /m (20.1 CF/LF)	2.29 m ³ /m (24.6 CF/LF)	2.50 m ³ /m (26.6 CF/LF)	2.51 m ³ /m (26.6 CF/LF)	2.19 m ³ /m (23.6 CF/LF)	2.76 m ³ /m (28.7 CF/LF)	2.40 m ³ /m (25.8 CF/LF)	3.00 m ³ /m (32.2 CF/LF)	2.20 m ³ /m (23.7 CF/LF)	2.86 m ³ /m (30.8 CF/LF)	3.10 m ³ /m (33.3 CF/LF)	2.53 m ³ /m (27.2 CF/LF)
	Reinforcement	277 kg/m (186 LB/LF)	241 kg/m (162 LB/LF)	286 kg/m (192 LB/LF)	2.66 kg/m (179 LB/LF)	307 kg/m (206 LB/LF)	283 kg/m (190 LB/LF)	338 kg/m (227 LB/LF)	315 kg/m (212 LB/LF)	308 kg/m (207 LB/LF)	293 kg/m (197 LB/LF)	327 kg/m (220 LB/LF)	310 kg/m (208 LB/LF)

SPAN		2440 mm (8')					
HEIGHT		1220 mm (4')		1520 mm (5')		1830 mm (6')	
Maximum Earth Cover		3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')
Conc	Roof T ₁	205 mm (8")	280 mm (11")	205 mm (8")	280 mm (11")	205 mm (8")	280 mm (11")
	Walls T ₂	150 mm (6")	190 mm (7½")	165 mm (6½")	205 mm (8")	180 mm (7")	230 mm (9")
	Invert T ₃	205 mm (8")	290 mm (11½")	205 mm (8")	290 mm (11½")	205 mm (8")	290 mm (11½")
Reinf	Spacing	225 mm (9")	250 mm (10")	225 mm (9")	250 mm (10")	225 mm (9")	250 mm (10")
	"g" Size Bar ■	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)
	"f" Size Bar ■	16M (#5)	16M (#5)	16M (#5)	16M (#5)	16M (#5)	16M (#5)
	"a" Size Bar ■	19M (#6)	13M (#4)	19M (#6)	13M (#4)	19M (#6)	13M (#4)
	"e" Size Bar ■	13M (#4)	16M (#5)	16M (#5)	19M (#6)	19M (#6)	22M (#7)
Quantities	Concrete	2.71 m ³ /m (29.2 CF/LF)	3.73 m ³ /m (40.1 CF/LF)	2.90 m ³ /m (31.2 CF/LF)	3.94 m ³ /m (42.4 CF/LF)	3.10 m ³ /m (33.4 CF/LF)	4.23 m ³ /m (45.5 CF/LF)
	Reinforcement	421 kg/m (283 LB/LF)	353 kg/m (237 LB/LF)	449 kg/m (302 LB/LF)	499 kg/m (266 LB/LF)	506 kg/m (340 LB/LF)	521 kg/m (350 LB/LF)

• See Note 5, on Standard Plan D81A

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
<div style="display: flex; justify-content: space-between;"> <div> <p><i>Paul Cotter</i> REGISTERED CIVIL ENGINEER</p> <p>July 1, 2002 PLANS APPROVAL DATE</p> <p><small>The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.</small></p> <p><small>Caltrans now has a web site! To get to the web site, go to http://www.dot.ca.gov</small></p> </div> <div> <p>REGISTERED PROFESSIONAL ENGINEER</p> <p><i>Paul Cotter</i> No. C35092 Exp. 9-30-03 STATE OF CALIFORNIA</p> </div> </div>					

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**CAST-IN-PLACE
REINFORCED CONCRETE
DOUBLE BOX CULVERT**

These "Standard Plans for Construction of Local Streets and Roads" contain units in two systems of measurement: International System of Units (SI or "metric") and United States Standard Measures shown in the parentheses ("). The measurements expressed in the two systems are not necessarily equal or interchangeable. See the "Foreword" at the beginning of this publication.



NO SCALE

D81B

SPAN			3050 mm (10')											
HEIGHT			1520 mm (5')		1830 mm (6')		2135 mm (7')		2440 mm (8')		2745 mm (9')		3050 mm (10')	
Maximum Earth Cover			3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')
Conc	Roof	T ₁	230 mm (9")	320 mm (12½")	230 mm (9")	320 mm (12½")	230 mm (9")	320 mm (12½")	230 mm (9")	320 mm (12½")	240 mm (9½")	240 mm (9½")	240 mm (9½")	320 mm (12½")
	Walls	T ₂	205 mm (8")	205 mm (8")	205 mm (8")	215 mm (8½")	205 mm (8")	205 mm (8")	205 mm (8")	270 mm (10½")	215 mm (8½")	290 mm (11½")	240 mm (9½")	320 mm (12½")
	Invert	T ₃	230 mm (9")	320 mm (12½")	230 mm (9")	320 mm (12½")	230 mm (9")	320 mm (12½")	230 mm (9")	320 mm (12½")	230 mm (9")	320 mm (12½")	230 mm (9")	320 mm (12½")
Reinf	Spacing		275 mm (11")	190 mm (7½")	265 mm (10½")	190 mm (7½")	250 mm (10")	200 mm (8")	250 mm (10")	200 mm (8")	265 mm (10½")	200 mm (8")	265 mm (10½")	215 mm (8½")
	"g"	Size Bar *	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)
	"f"	Size Bar *	22M (#7)	16M (#5)	19M (#6)	16M (#5)	19M (#6)	16M (#5)	19M (#6)	16M (#5)	19M (#6)	16M (#5)	19M (#6)	16M (#5)
	"a"	Size Bar *	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)
	"b"	Size Bar *	16M (#5)	16M (#5)	13M (#4)	16M (#5)	16M (#5)	16M (#5)	19M (#6)	16M (#5)	19M (#6)	19M (#6)	19M (#6)	19M (#6)
	Dim "B"		1550 mm (4'-9")	800 mm (2'-7")	625 mm (2'-0")	850 mm (2'-9")	700 mm (2'-3")	850 mm (2'-9")	800 mm (2'-7")	950 mm (3'-1")	800 mm (2'-7")	950 mm (3'-1")	800 mm (2'-7")	950 mm (3'-1")
	Dim "Bw"		1225 mm (4'-0")	1500 mm (4'-11")	1225 mm (4'-0")	1500 mm (4'-11")	1225 mm (4'-0")	1500 mm (4'-11")	1225 mm (4'-0")	1500 mm (4'-11")	1225 mm (4'-0")	1500 mm (4'-11")	1225 mm (4'-0")	1500 mm (4'-11")
	"c"	Size Bar *	16M (#5)	16M (#5)	19M (#6)	19M (#6)	19M (#6)	19M (#6)	19M (#6)	22M (#7)	19M (#6)	22M (#7)	19M (#6)	22M (#7)
	Dim "C"		950 mm (3'-1")	850 mm (2'-9")	1150 mm (3'-9")	1000 mm (3'-3")	1375 mm (4'-6")	1300 mm (4'-3")	1675 mm (5'-6")	1375 mm (4'-6")	1850 mm (6'-0")	1450 mm (4'-9")	1850 mm (6'-0")	1450 mm (4'-9")
	"e"	Size Bar *	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	16M (#5)	16M (#5)
Quantities	Concrete		3.97 m ³ /m (42.7 CF/LF)	5.17 m ³ /m (55.6 CF/LF)	4.15 m ³ /m (44.7 CF/LF)	5.41 m ³ /m (58.2 CF/LF)	4.34 m ³ /m (46.7 CF/LF)	5.74 m ³ /m (61.8 CF/LF)	4.52 m ³ /m (48.7 CF/LF)	6.09 m ³ /m (65.6 CF/LF)	4.88 m ³ /m (52.5 CF/LF)	6.50 m ³ /m (70.0 CF/LF)	5.23 m ³ /m (56.3 CF/LF)	6.92 m ³ /m (74.5 CF/LF)
	Reinforcement		551 kg/m (370 LB/LF)	676 kg/m (454 LB/LF)	567 kg/m (381 LB/LF)	735 kg/m (494 LB/LF)	622 kg/m (418 LB/LF)	735 kg/m (494 LB/LF)	6.84 kg/m (460 LB/LF)	759 kg/m (510 LB/LF)	723 kg/m (486 LB/LF)	818 kg/m (550 LB/LF)	771 kg/m (518 LB/LF)	845 kg/m (568 LB/LF)

SPAN			3660 mm (12')											
HEIGHT			1830 mm (6')		2135 mm (7')		2440 mm (8')		2745 mm (9')		3050 mm (10')		3350 mm (11')	
Maximum Earth Cover			3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')
Conc	Roof	T ₁	255 mm (10")	370 mm (14½")	255 mm (10")	370 mm (14½")	255 mm (10")	370 mm (14½")	255 mm (10")	370 mm (14½")	255 mm (10")	370 mm (14½")	255 mm (10")	370 mm (14½")
	Walls	T ₂	205 mm (8")	215 mm (8½")	205 mm (8")	230 mm (9")	215 mm (8½")	270 mm (10½")	230 mm (9")	290 mm (11½")	240 mm (9½")	320 mm (12½")	255 mm (10")	355 mm (14")
	Invert	T ₃	255 mm (10")	380 mm (15")	255 mm (10")	380 mm (15")	255 mm (10")	380 mm (15")	255 mm (10")	380 mm (15")	255 mm (10")	380 mm (15")	255 mm (10")	380 mm (15")
Reinf	Spacing		225 mm (9")	200 mm (8")	225 mm (9")	200 mm (8")	200 mm (8")	190 mm (7½")	200 mm (8")	190 mm (7½")	215 mm (8½")	190 mm (7½")	215 mm (8½")	200 mm (8")
	"g"	Size Bar *	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)
	"f"	Size Bar *	22M (#7)	22M (#7)	22M (#7)	22M (#7)	19M (#6)	19M (#6)	19M (#6)	19M (#6)	19M (#6)	19M (#6)	19M (#6)	19M (#6)
	"a"	Size Bar *	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)
	"b"	Size Bar *	16M (#5)	16M (#5)	16M (#5)	16M (#5)	16M (#5)	19M (#6)	16M (#5)	19M (#6)	19M (#6)	16M (#5)	19M (#6)	19M (#6)
	Dim "B"		800 mm (2'-7")	950 mm (3'-1")	925 mm (3'-0")	975 mm (3'-2")	1075 mm (3'-6")	975 mm (3'-2")	1075 mm (3'-6")	1025 mm (3'-4")	1150 mm (3'-9")	1025 mm (3'-4")	1150 mm (3'-9")	1025 mm (3'-4")
	Dim "Bw"		1250 mm (4'-1")	975 mm (3'-2")	1250 mm (4'-1")	1025 mm (3'-4")	1250 mm (4'-1")	1025 mm (3'-4")	1250 mm (4'-1")	1100 mm (3'-7")	1150 mm (3'-9")	1100 mm (3'-7")	1150 mm (3'-9")	1100 mm (3'-7")
	"c"	Size Bar *	19M (#6)	19M (#6)	19M (#6)	19M (#6)	19M (#6)	19M (#6)	19M (#6)	19M (#6)	19M (#6)	19M (#6)	22M (#7)	22M (#7)
	Dim "C"		1175 mm (3'-10")	1100 mm (3'-7")	1375 mm (4'-6")	1325 mm (4'-4")	1700 mm (5'-7")	1525 mm (5'-0")	2000 mm (6'-6")	1575 mm (5'-2")	2200 mm (7'-2")	1625 mm (5'-4")	2275 mm (7'-5")	1700 mm (5'-7")
	"e"	Size Bar *	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	16M (#5)	16M (#5)
Quantities	Concrete		5.11 m ³ /m (55.0 CF/LF)	7.09 m ³ /m (76.3 CF/LF)	5.30 m ³ /m (57.0 CF/LF)	7.35 m ³ /m (79.4 CF/LF)	5.56 m ³ /m (59.8 CF/LF)	7.79 m ³ /m (83.8 CF/LF)	5.82 m ³ /m (62.7 CF/LF)	8.18 m ³ /m (88.1 CF/LF)	6.12 m ³ /m (65.9 CF/LF)	8.61 m ³ /m (92.7 CF/LF)	6.42 m ³ /m (69.1 CF/LF)	9.66 m ³ /m (104.0 CF/LF)
	Reinforcement		808 kg/m (543 LB/LF)	899 kg/m (604 LB/LF)	838 kg/m (563 LB/LF)	961 kg/m (646 LB/LF)	892 kg/m (600 LB/LF)	987 kg/m (663 LB/LF)	914 kg/m (614 LB/LF)	933 kg/m (688 LB/LF)	1028 kg/m (627 LB/LF)	1043 kg/m (691 LB/LF)	1115 kg/m (701 LB/LF)	1091 kg/m (733 LB/LF)

* See Note 5, on Standard Plan D81C


DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
<div style="text-align: center;">  Paul Cotter REGISTERED CIVIL ENGINEER No. C24509 July 1, 2002 PLANS APPROVAL DATE <small>The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.</small> </div> <div style="text-align: right;">  </div>					
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STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**CAST-IN-PLACE
REINFORCED CONCRETE
DOUBLE BOX CULVERT**

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NO SCALE

D81C

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
<div>  <div> Paul Cotter REGISTERED CIVIL ENGINEER No. C3509 Exp. 9-30-03 STATE OF CALIFORNIA </div> </div>					
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SPAN		4270 mm (14')															
HEIGHT		2135 mm (7')		2440 mm (8')		2745 mm (9')		3050 mm (10')		3350 mm (11')		3660 mm (12')		3960 mm (13')		4270 mm (14')	
Maximum Earth Cover		3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')	3.0 m (10')	6.0 m (20')
Conc	Roof T ₁	290 mm (11 1/2")	420 mm (16 1/2")	290 mm (11 1/2")	420 mm (16 1/2")	290 mm (11 1/2")	420 mm (16 1/2")	290 mm (11 1/2")	420 mm (16 1/2")	290 mm (11 1/2")	420 mm (16 1/2")	290 mm (11 1/2")	420 mm (16 1/2")	290 mm (11 1/2")	420 mm (16 1/2")	290 mm (11 1/2")	420 mm (16 1/2")
	Walls T ₂	215 mm (8 1/2")	240 mm (9 1/2")	215 mm (8 1/2")	270 mm (10 1/2")	230 mm (9")	290 mm (11 1/2")	240 mm (9 1/2")	320 mm (12 1/2")	270 mm (10 1/2")	355 mm (14")	290 mm (11 1/2")	380 mm (15")	320 mm (12 1/2")	420 mm (16 1/2")	330 mm (13")	445 mm (17 1/2")
	Invert T ₃	290 mm (11 1/2")	430 mm (17")	290 mm (11 1/2")	430 mm (17")	290 mm (11 1/2")	430 mm (17")	290 mm (11 1/2")	430 mm (17")	290 mm (11 1/2")	430 mm (17")	290 mm (11 1/2")	430 mm (17")	290 mm (11 1/2")	430 mm (17")	290 mm (11 1/2")	430 mm (17")
Reinf	Spacing	215 mm (8 1/2")	200 mm (8")	215 mm (8 1/2")	200 mm (8")	215 mm (8 1/2")	200 mm (8")	215 mm (8 1/2")	200 mm (8")	215 mm (8 1/2")	200 mm (8")	215 mm (8 1/2")	200 mm (8")	215 mm (8 1/2")	200 mm (8")	215 mm (8 1/2")	200 mm (8")
	"a" Size Bar #	25M (#8)	25M (#8)	25M (#8)	25M (#8)	25M (#8)	25M (#8)	25M (#8)	25M (#8)	25M (#8)	25M (#8)	25M (#8)	25M (#8)	25M (#8)	25M (#8)	25M (#8)	25M (#8)
	"a" Size Bar #	19M (#6)	19M (#6)	19M (#6)	19M (#6)	19M (#6)	19M (#6)	19M (#6)	19M (#6)	19M (#6)	19M (#6)	19M (#6)	19M (#6)	19M (#6)	19M (#6)	19M (#6)	19M (#6)
	"a" Size Bar #	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)
	"a" Size Bar #	16M (#5)	19M (#6)	19M (#6)	19M (#6)	16M (#5)	19M (#6)	19M (#6)	19M (#6)	19M (#6)	19M (#6)	19M (#6)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)
	Dim "B"	800 mm (2'-7")	800 mm (2'-7")	1000 mm (3'-3")	1000 mm (3'-3")	1225 mm (4'-0")	1225 mm (4'-0")	1225 mm (4'-0")	1225 mm (4'-0")	1400 mm (4'-7")	1325 mm (4'-4")	1400 mm (4'-7")	1500 mm (4'-11")	1600 mm (5'-3")	1500 mm (4'-11")	1600 mm (5'-3")	1500 mm (4'-11")
	Dim "Bw"	1525 mm (5'-0")	1150 mm (3'-9")	1525 mm (5'-0")	1375 mm (4'-6")	1525 mm (5'-0")	1525 mm (5'-0")	1525 mm (5'-0")	1525 mm (5'-0")	1450 mm (4'-9")	1675 mm (5'-6")	1450 mm (4'-9")	1875 mm (6'-2")	1575 mm (5'-2")	1875 mm (6'-2")	1575 mm (5'-2")	1875 mm (6'-2")
	"c" Size Bar #	19M (#6)	19M (#6)	19M (#6)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	25M (#8)	25M (#8)
	Dim "C"	1300 mm (4'-3")	1200 mm (3'-11")	1675 mm (5'-6")	1575 mm (5'-2")	2350 mm (7'-9")	1725 mm (5'-8")	2575 mm (8'-6")	1950 mm (6'-5")	2700 mm (8'-10")	2000 mm (6'-6")	2750 mm (9'-0")	2075 mm (6'-10")	2825 mm (9'-3")	2075 mm (6'-10")	2825 mm (9'-3")	2075 mm (6'-10")
	"e" Size Bar #	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	13M (#4)	16M (#5)	16M (#5)	16M (#5)	16M (#5)	16M (#5)	19M (#6)	19M (#6)
Quantities	Concrete	6.67 m ³ /m (71.8 CF/LF)	9.26 m ³ /m (99.7 CF/LF)	6.87 m ³ /m (73.9 CF/LF)	9.66 m ³ /m (104.0 CF/LF)	7.14 m ³ /m (76.9 CF/LF)	10.00 m ³ /m (108.0 CF/LF)	7.43 m ³ /m (80.0 CF/LF)	10.50 m ³ /m (113.0 CF/LF)	7.82 m ³ /m (84.2 CF/LF)	11.10 m ³ /m (119.0 CF/LF)	8.25 m ³ /m (88.8 CF/LF)	11.50 m ³ /m (124.0 CF/LF)	8.74 m ³ /m (94.1 CF/LF)	12.20 m ³ /m (131.0 CF/LF)	9.11 m ³ /m (98.1 CF/LF)	12.70 m ³ /m (137.0 CF/LF)
	Reinforcement	985 kg/m (662 LB/LF)	1056 kg/m (710 LB/LF)	1064 kg/m (715 LB/LF)	1165 kg/m (783 LB/LF)	1125 kg/m (756 LB/LF)	1220 kg/m (820 LB/LF)	1201 kg/m (807 LB/LF)	1259 kg/m (846 LB/LF)	1240 kg/m (833 LB/LF)	1311 kg/m (873 LB/LF)	1426 kg/m (881 LB/LF)	1315 kg/m (958 LB/LF)	1455 kg/m (884 LB/LF)	1491 kg/m (978 LB/LF)	1552 kg/m (1002 LB/LF)	1652 kg/m (1110 LB/LF)

• See Note 5, on Standard Plan D81A

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REINFORCED CONCRETE
DOUBLE BOX CULVERT**

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NO SCALE

D81D

DESIGN NOTES

Specifications:

Design:
Bridge Design Specification (1983 AASHTO Specifications with revisions by Caltrans).
Load Factors: 1.5 D + 1.5 E + 2.5 (L + I)
Where:
D=Dead Load
E=Earth Load
L=Live Load
I=Impact
Capacity reduction factor is included.

Live load:
HS20-44 truck
Apply impact only to the roof slab.

Earth Cover	Impact (%)
Up to 300 mm (1.0')	30
301mm to 600 mm (1.1' to 2.0')	20
601mm to 900 mm (2.1' to 3.0')	10
Over 900 mm (3.0')	0

No surcharge on walls due to live load.

Earth loads:
Earth pressures for two conditions:
22.0 kPa/m (140 lbs/CF) vertical, 6.6 kPa/m (42 lbs/CF) horizontal.
22.0 kPa/m (140 lbs/CF) vertical, 22.0 kPa/m (140 lbs/CF) horizontal.

Unit stresses:

$f_c = 25 \text{ MPa}$ (3600 psi)
 $f_y = 400 \text{ MPa}$ (60,000 psi)

Distribution "d" bars:

Up to and including 3.0 m (10') cover
Expressed as a percent of main positive reinforcement required:
 $\frac{100}{0.05726\sqrt{f_c}} \cdot \left(\frac{100}{\sqrt{f_c}} \right) \text{ Max } 50\%$

Over 3.0 m (10') cover
#13M (#4) @ 450 mm (18") maximum.

Shear:
maximum allowable shear, $v_c = 0.29\sqrt{f_c}$, MPa, ($v_c = \sqrt{3.5f_c}$, psi)

Exclusions:

Compressive reinforcement and negative-moment reduction (for continuity) do not apply.
Axial loading on members has not been considered.

CONSTRUCTION NOTES

Construction loads:

Strutting required as shown on Standard Plan D88.
Strutting may be required on culvert extensions when existing parapet is removed.

Expansion joints:

Invert:
No expansion joints shall be permitted.

Roof and Walls:

When cover is less than span length:
Place 13 mm (1/2") expansion joint filler at 9 m (30') ± centers outside the paved roadway lanes and place Bridge Detail 3-2, Standard Plan B0-3, at 9 m (30') centers under paved roadway lanes.

When cover is more than span length:
Place 13 mm (1/2") expansion joint filler at 9 m (30') ± centers and additional 13 mm (1/2") expansion joints at locations of change in foundation character, as directed by the Engineer.

Construction joints:

Temporary joints may be permitted if normal (or radial) to ϕ of RCB. Otherwise, the contractor is to submit a proposal for consideration.

Cutoff walls:

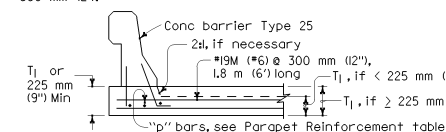
1.2 m (4') cutoff walls are to be provided at inlet and/or outlet unless adjacent channel is lined and unless otherwise shown. These walls are to be extended if scour conditions warrant.

Earthwork:

See Standard Plan A62E.

Backfill:

See Standard Specifications, except that the difference in level of backfill (against outside walls) shall not exceed 600 mm (2').



BARRIER SECTION 9.0 m (30') MINIMUM

GENERAL NOTES

Designation:

Standard single or multiple box culverts are shown on plans as span times height with maximum cover over roof, thus: 2440 mm x 1520 mm (8' x 5') RCB with 3 m (10') or DBL 3050 mm x 1520 mm (10' x 5') RCB with 6 m (20'), followed by alternatives.

Alternatives:

Single cell invert will be sloped unless "trapezoidal invert", "flat invert" or "V invert" is included in designation.

Multiple cell invert will be vee unless "flat invert" is specified. Ends of culvert will be rounded unless "square ends" are designated. Parapets will be as shown unless designated in plans. Such designations may be different for inlet and outlet ends.

Quantities:

Quantities are for the sloped or vee invert and do not include "d" bars, nor splices in longitudinal bars, nor temperature reinforcement for exposed roof, nor concrete or reinforcement for parapets, cutoff walls or paving notches.

Reinforcement placement:

Main reinforcement is to be placed transverse or, for curved culverts, radial. When radial, reinforcing spacing of the "d", "f" and "g" bars is measured along the centerline. Stagger splices not shown. Hooks may be rotated or tilted, as necessary, for clearance.

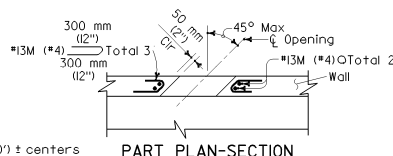
Special reinforcement coverage:

Box standard plans are not to be used for culverts in a corrosive environment or where there is a severe abrasive flow condition or in freeze-thaw locations.

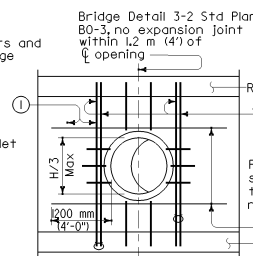
Special design:

Required for culverts with conditions, loads, design bearing pressures or sizes greater than those given on this plan or Standard Plans D80 & D81. Also required for multiple cell culverts with unequal spans. For culverts with railroad loading, see the current AREA design specification.

3 or more cells:
For culverts with more than two cells, use dimensions and reinforcement for the standard "double box culvert" and adjust quantities accordingly.



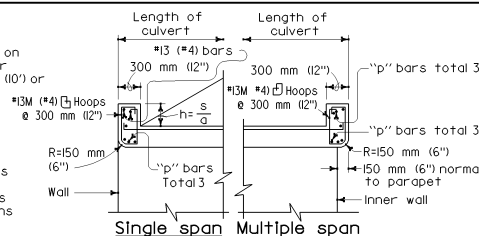
PART PLAN-SECTION



LONGITUDINAL SECTION

UTILITY OPENING-WALL

① Adjacent to each side of the opening, place additional bars equivalent to half the interrupted main reinforcement.



Single span Multiple span

PARAPET DETAIL

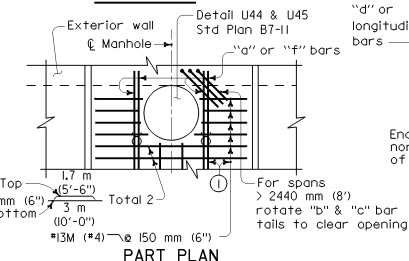
s = Clear span (mm)
a = 12 cosine skew angle

Span	Skew Angle	Parapet "p" bars			
		0° TO 15°	16° TO 30°	31° TO 45°	46° TO 60°
1220 mm (4')		#13M (#4)	#13M (#4)	#13M (#4)	
1830 mm (6')		#13M (#4)	#13M (#4)	#16M (#5)	
2440 mm (8')		#13M (#4)	#16M (#5)	#19M (#6)	
3050 mm (10')		#16M (#5)	#19M (#6)	#22M (#7)	
3660 mm (12')		#19M (#6)	#22M (#7)	#25M (#8)	
4270 mm (14')		#22M (#7)	#25M (#8)	#29M (#9)	

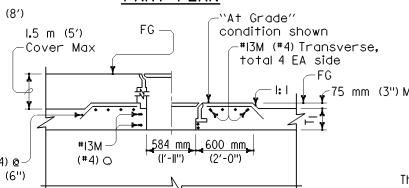
PARAPET REINFORCEMENT

Height	Cover		
	3 m (10')	6 m (20')	9 m (30')
1830 mm (6')	95 kPa (6.7 Tsf)	150 kPa (10.7 Tsf)	160 kPa (11.6 Tsf)
2440 mm (8')	105 kPa (7.5 Tsf)	160 kPa (11.6 Tsf)	170 kPa (12.4 Tsf)
3050 mm (10')	115 kPa (8.2 Tsf)	170 kPa (12.4 Tsf)	180 kPa (13.1 Tsf)
3660 mm (12')	125 kPa (9.0 Tsf)	180 kPa (13.1 Tsf)	190 kPa (13.8 Tsf)
4270 mm (14')	135 kPa (9.7 Tsf)	190 kPa (13.8 Tsf)	200 kPa (14.6 Tsf)

DESIGN BEARING PRESSURE

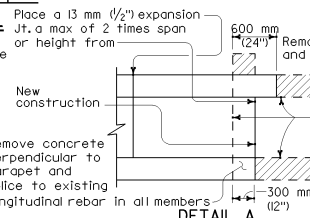


PART PLAN

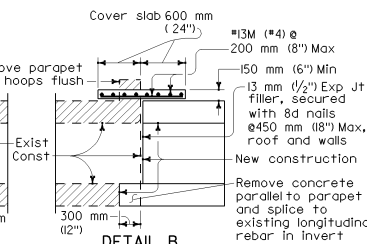


PART LONGITUDINAL SECTION

MANHOLE



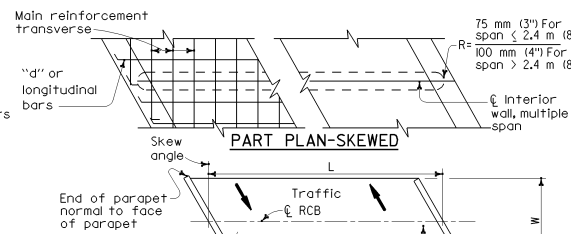
DETAIL A



DETAIL B

(Single cell only, no skew allowed, 300 mm (12") minimum cover.)

CULVERT EXTENSION



PART PLAN-SKEWED

RCB TERMINOLOGY

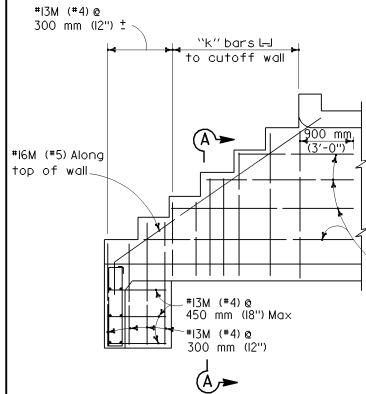
STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION CAST-IN-PLACE REINFORCED CONCRETE CULVERT MISCELLANEOUS DETAILS

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NO SCALE

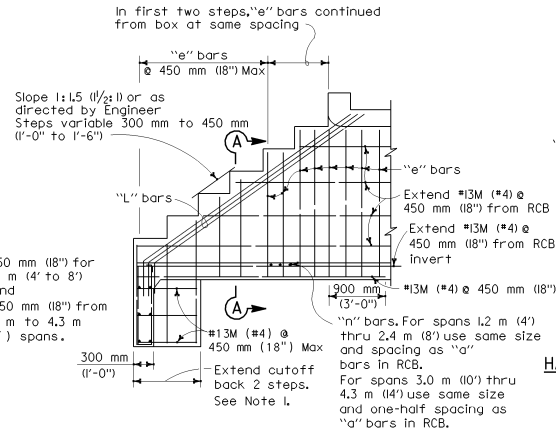
D82





LONGITUDINAL SECTION

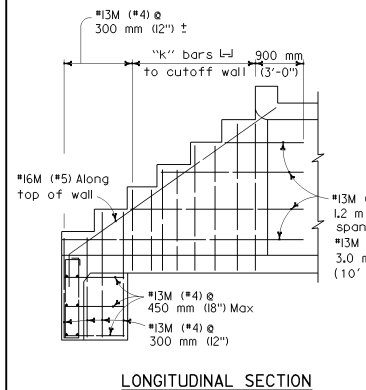
Showing reinforcement in outside face



LONGITUDINAL SECTION

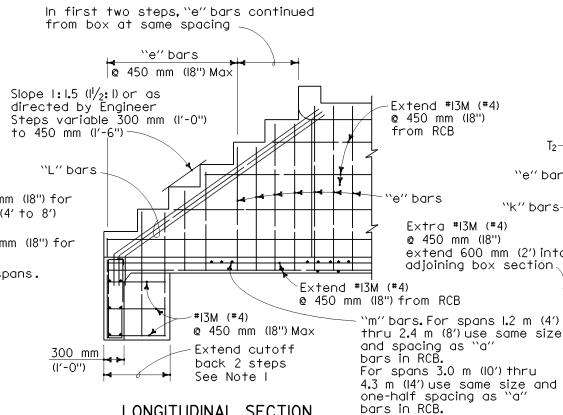
Showing reinforcement in inside face

TYPE "E" STEPPED WINGWALL (SINGLE BOX CULVERT)



LONGITUDINAL SECTION

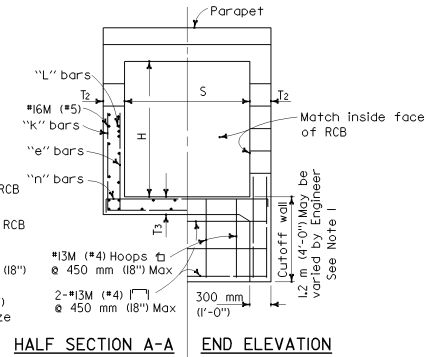
Showing reinforcement in outside face



LONGITUDINAL SECTION

Showing reinforcement in inside face

TYPE "E" STEPPED WINGWALL (MULTIPLE BOX CULVERT)

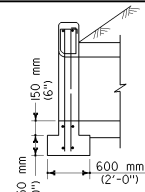


HALF SECTION A-A

END ELEVATION

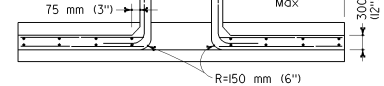
Dimensions S and T₂ to be same as adjacent RCB.T₂ = Same as adjacent RCB (200 mm (8") Min).

DIST	COUNTY	ROUTE	KILOMETER	POST	SHEET	TOTAL
<p>Paul Cotter REGISTERED CIVIL ENGINEER</p> <p>July 1, 2002 PLANS APPROVAL DATE</p> <p>The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.</p> <p>Caltans now has a web site. To get to the web site, go to http://www.dsd.ca.gov</p>						

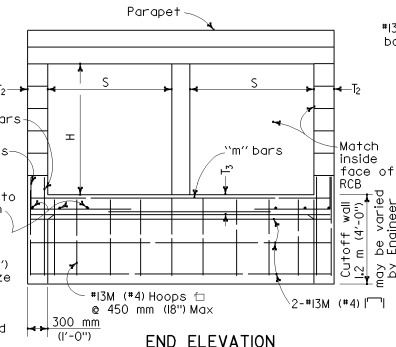


SECTION B-B

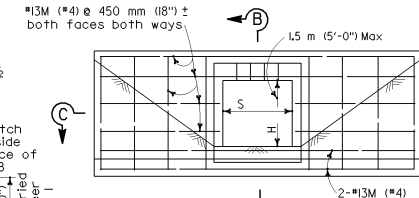
Extend all longitudinal bars in box walls 600 mm (2'-0") into wingwalls



SECTION C-C



END ELEVATION

Dimensions S and T₂ to be same as adjacent RCB.T₂ = Same as adjacent RCB (200 mm (8") min).

ELEVATION

TYPE "D" STRAIGHT WINGWALL

Details similar for multiple span boxes. For Parapet Details not shown see Standard Plan D82.

NOTES:

- Eliminate cutoff walls if adjacent channel is paved.
- For "H" not shown use reinforcement for next greater height.

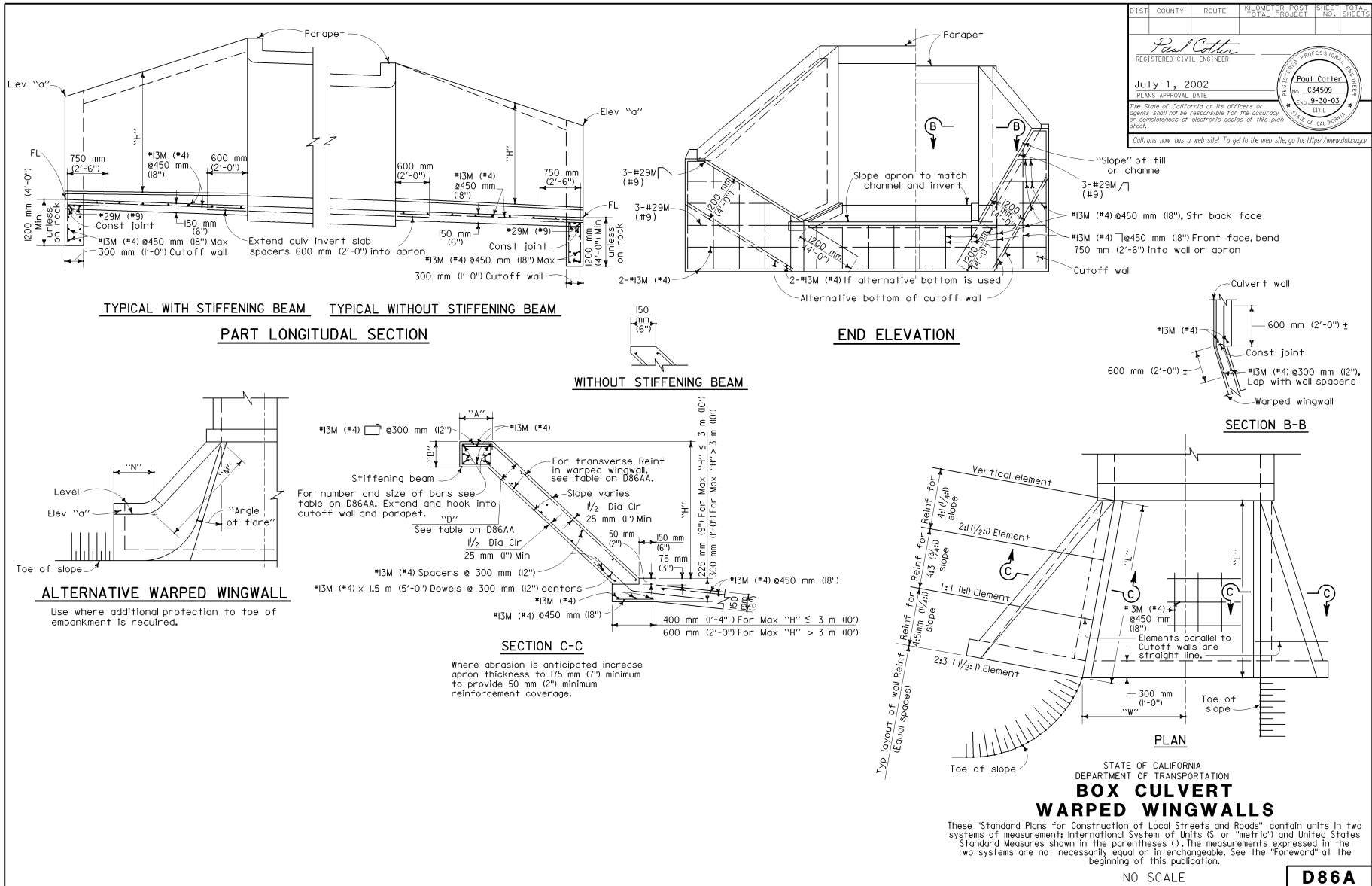
		TABLE OF REINFORCEMENT FOR TYPE "E" WINGWALLS									
H (See Note 2)		0.9 m (3')	1.2 m (4')	1.5 m (5')	1.8 m (6')	2.1 m (7')	2.4 m (8')	3.0 m (10')	3.7 m (12')	4.3 m (14')	
"k"	Bar No	13M (#4)	13M (#4)	16M (#5)	16M (#5)	16M (#5)	16M (#5)	16M (#5)	16M (#5)	16M (#5)	
	Spacing	300 mm (12")	300 mm (12")	300 mm (12")	250 mm (10")	225 mm (9")	200 mm (8")	175 mm (7")	125 mm (5")	100 mm (4")	
"L"	Bar No	16M (#5)	16M (#5)	19M (#6)	19M (#6)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	22M (#7)	
	Number each wall	2	2	3	3	3	3	3	3	3	


STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**BOX CULVERT WINGWALLS
TYPES D AND E**


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NO SCALE

D85



DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
 REGISTERED CIVIL ENGINEER					
July 1, 2002 PLANS APPROVAL DATE					
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Caltrans now has a web site! To get to the web site, go to: http://www.dot.ca.gov					



WARPED WINGWALLS																												
WALL DIMENSIONS AND REINFORCING									STIFFENING BEAM DIMENSIONS AND REINFORCING																			
Element Slope	"H"	2.4 m (8') or less	3.0 m (10')	3.7 m (12')	4.3 m (14')	4.9 m (16')	5.5 m (18')	6.1m (20')	"H" Max	"L"	3.7 m (12')	4.3 m (14')	4.9 m (16')	5.5 m (18')	6.1 m (20')	7.6 m (25')	9.1m (30')	10.7 m (35')	12.2 m (40') or more									
4:1 (1/4:1)	Front face Reinf	#13M (#4) ø300 mm (12")	#13M (#4) ø175 mm (7")	#16M (#5) ø175 mm (7")	#16M (#5) ø125 mm (5")	#19M (#6) ø150 mm (6")	#22M (#7) ø175 mm (7")	#22M (#7) ø150 mm (6")	1.8 m (6')	No beam. Place 2-#19M (#6) in each face along top of wall.																		
	Rear face Reinf	#13M (#4) ø300 mm (12")	#13M (#4) ø300 mm (12")	#13M (#4) ø300 mm (12")	#13M (#4) ø300 mm (12")	#13M (#4) ø300 mm (12")	#13M (#4) ø300 mm (12")	#13M (#4) ø300 mm (12")																				
4:3 (3/4:1)	Front face Reinf	#13M (#4) ø300 mm (12")	#13M (#4) ø300 mm (12")	#13M (#4) ø300 mm (12")	#13M (#4) ø300 mm (12")	#13M (#4) ø250 mm (10")	#13M (#4) ø200 mm (8")	#13M (#4) ø150 mm (6")	2.4 m (8')	face along top of wall.																		
	Rear face Reinf	#13M (#4) ø300 mm (12")	#13M (#4) ø300 mm (12")	#13M (#4) ø300 mm (12")	#13M (#4) ø300 mm (12")	#13M (#4) ø250 mm (10")	#13M (#4) ø200 mm (8")	#13M (#4) ø150 mm (6")																				
4:5 (1 1/4:1)	Front face Reinf	#13M (#4) ø300 mm (12")	#13M (#4) ø300 mm (12")	#13M (#4) ø300 mm (12")	#13M (#4) ø300 mm (12")	#13M (#4) ø300 mm (12")	#13M (#4) ø300 mm (12")	#13M (#4) ø300 mm (12")	3.0 m (10')	Total 6-#19M (#6)																		
	Rear face Reinf	#13M (#4) ø200 mm (8")	#13M (#4) ø200 mm (8")	#13M (#4) ø225 mm (9")	#16M (#5) ø150 mm (6")	#19M (#6) ø175 mm (7")	#19M (#6) ø150 mm (6")	#22M (#7) ø150 mm (6")																				
"D" at Cutoff Wall		150 mm (6")	150 mm (6")	150 mm (6")	190 mm (7 1/2")	200 mm (8")	240 mm (9 1/2")	280 mm (11")																				
"D" at Culvert		150 mm (6")	150 mm (6")	150 mm (6")	200 mm (8")	240 mm (9 1/2")	280 mm (11")	330 mm (13")						Total 6-#25M (#8)														
											Total 6-#19M (#6)									Total 6-#22M (#7)								
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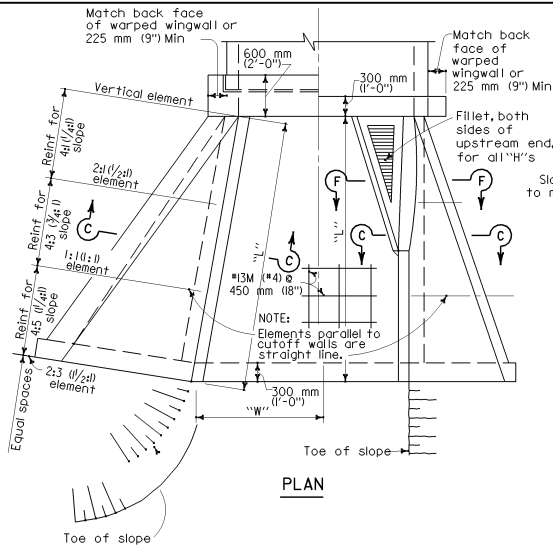
NOTES: Walls designed for 600 mm (2') surcharge; earth density = 1900 kg/m³ (120LB/CU FT); equivalent fluid pressure = 5.66 KPa/m (36LB/CU FT).
 Vary "D" of warped wall uniformly from that at cutoff wall to that at culvert, for maximum "H" > 3.7m (12').
 Dimensions "L", "W", "H", "M", "N", Elevation "a", "Angle of flare", and end "Slope" (as apply) are shown on the plans.

STATE OF CALIFORNIA
 DEPARTMENT OF TRANSPORTATION
**BOX CULVERT
 WARPED WINGWALLS**

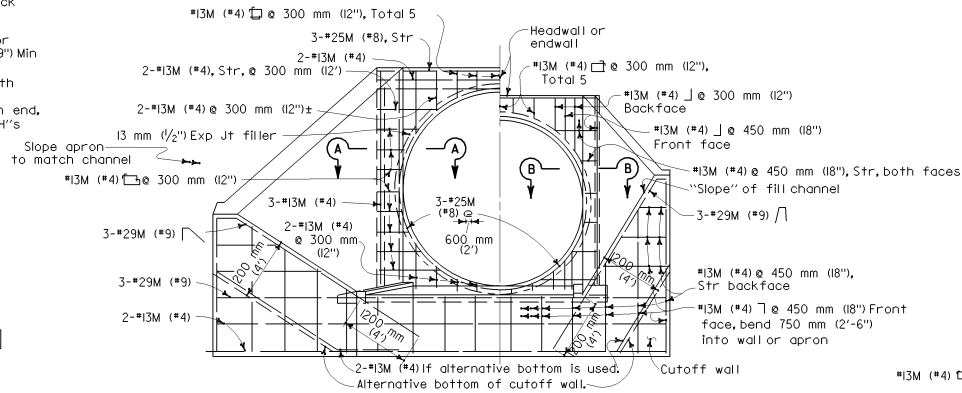
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NO SCALE

D86AA



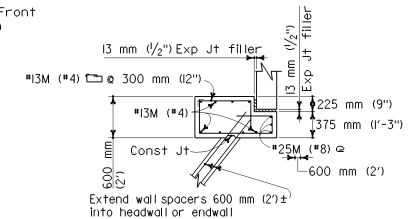
PLAN



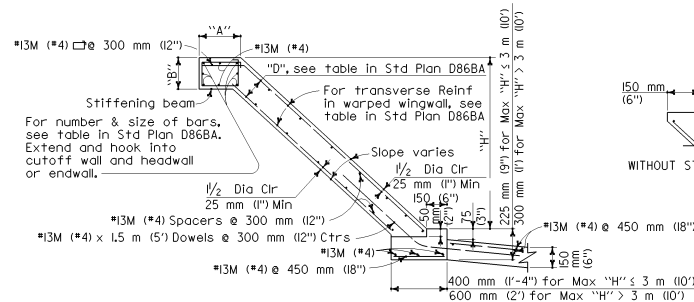
TYPICAL FOR MAXIMUM "H" > 3 m (10') TYPICAL FOR MAXIMUM "H" ≤ 3 m (10')

END ELEVATION

If at upstream end,
fillet is not shown

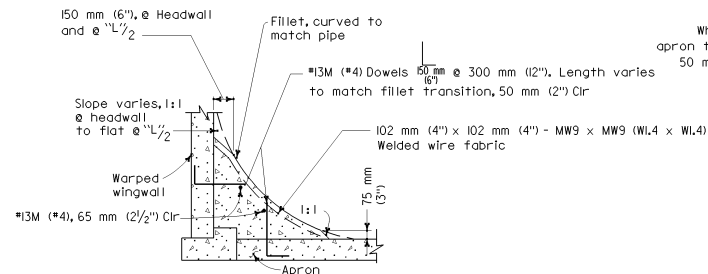


SECTION A-A

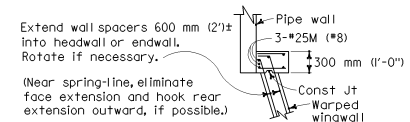


SECTION C-C

Where abrasion is anticipated, increase apron thickness to 175 mm (7") minimum to provide 50 mm (2") minimum reinforcement coverage.



SECTION F-F



SECTION B-B

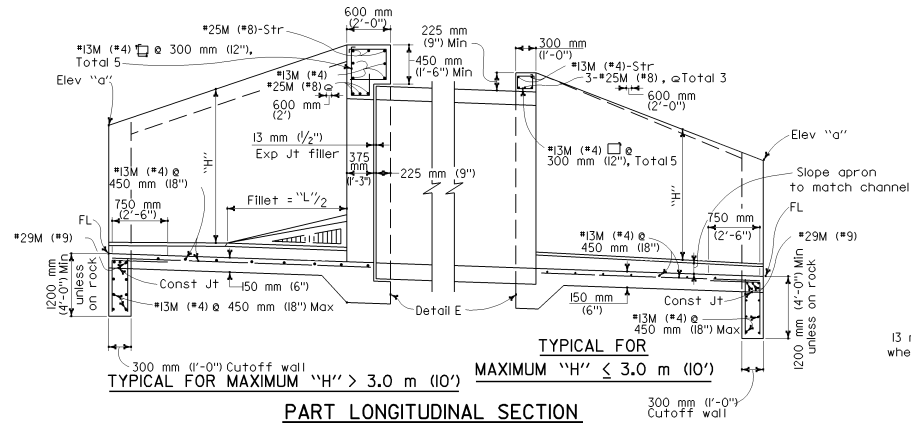
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

**PIPE CULVERT
HEADWALLS, ENDWALLS
AND WARPED WINGWALLS**

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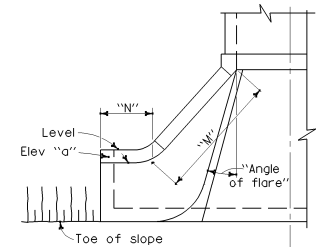
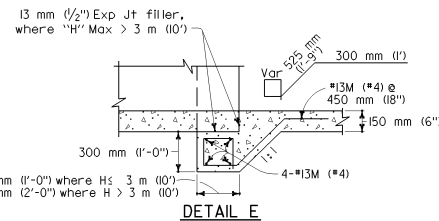
NO SCALE

D86B



NOTE:

RCP shown. Metal pipe similar except eliminate the expansion joint and use hook bolts \varnothing 480 mm (19") \pm spacing. Size and length provided by manufacturer.



Use where additional protection to toe of embankment is required. If at upstream end, fillet is not shown.

WARPED WINGWALLS

WALL DIMENSIONS AND REINFORCING										STIFFENING BEAM DIMENSIONS AND REINFORCING									
Element Slope	"H"	2.4 m (8') or less	3.0 m (10')	3.7 m (12')	4.3 m (14')	4.9 m (16')	5.5 m (18')	6.1m (20')		"L"	3.7 m (12')	4.3 m (14')	4.9 m (16')	5.5 m (18')	6.1m (20')	7.6 m (25')	9.1 m (30')	10.7 m (35')	12.2 m (40') or more
										"H" Max									
4:1 (1/4:1)	Front face Reinf	#13M (#4) ø300 mm (12")	#13M (#4) ø175 mm (7")	#16M (#5) ø175 mm (7")	#16M (#5) ø125 mm (5")	#19M (#6) ø150 mm (6")	#22M (#7) ø175 mm (7")	#22M (#7) ø150 mm (6")		1.8 m (6')	No beam. Place 2-#19M (#6) in each								
	Rear face Reinf	#13M (#4) ø300 mm (12")	#13M (#4) ø300 mm (12")	#13M (#4) ø300 mm (12")	#13M (#4) ø300 mm (12")	#13M (#4) ø300 mm (12")	#13M (#4) ø300 mm (12")	#13M (#4) ø300 mm (12")		2.4 m (8')	face along top of								
4:3 (3/4:1)	Front face Reinf	#13M (#4) ø300 mm (12")	#13M (#4) ø300 mm (12")	#13M (#4) ø300 mm (12")	#13M (#4) ø300 mm (12")	#13M (#4) ø250 mm (10")	#13M (#4) ø200 mm (8")	#13M (#4) ø150 mm (6")		3.0 m (10')	wall, "A"= 300 mm (1'-0")								
	Rear face Reinf	#13M (#4) ø300 mm (12")	#13M (#4) ø300 mm (12")	#13M (#4) ø300 mm (12")	#13M (#4) ø300 mm (12")	#13M (#4) ø250 mm (10")	#13M (#4) ø175 mm (7")	#13M (#4) ø150 mm (6")		3.7 m (12')	"B"= 225 mm (9") "A"= 450 mm (1'-6")								
4:5 (1 1/4:1)	Front face Reinf	#13M (#4) ø300 mm (12")	#13M (#4) ø300 mm (12")	#13M (#4) ø300 mm (12")	#13M (#4) ø300 mm (12")	#13M (#4) ø300 mm (12")	#13M (#4) ø300 mm (12")	#13M (#4) ø300 mm (12")		4.3 m (14')	Total 6-#19M (#6) "B"= 300 mm (1'-0") "A"= 560 mm (1'-10")								
	Rear face Reinf	#13M (#4) ø200 mm (8")	#13M (#4) ø200 mm (8")	#13M (#4) ø200 mm (8")	#13M (#4) ø200 mm (8")	#16M (#5) ø150 mm (6")	#19M (#6) ø175 mm (7")	#19M (#6) ø150 mm (6")		4.9 m (16')	Total 6-#22M (#7) "B"= 300 mm (1'-0") "A"= 600 mm (2'-0")								
"D" at Cutoff Wall		mm (in)	150 mm (6')	150 mm (6')	150 mm (6')	190 mm (7 1/2')	200 mm (8')	240 mm (9 1/2')	280 mm (11')	5.5 m (18')	Total 6-#25M (#8) "B"= 450 mm (1'-6")								
"D" at Culvert		mm (in)	150 mm (6')	150 mm (6')	150 mm (6')	200 mm (8')	240 mm (9 1/2')	280 mm (11')	330 mm (13')	6.1 m (20')	Total 8-#29M (#9)								

NOTES: Walls designed for 600 mm (2') surcharge; earth density = 1900 kg/m³ (120 LB/CU FT); equivalent fluid pressure = 5.66 KPa/m (36 LB/CU FT). Vary "D" of warped wall uniformly from that at cutoff wall to that at culvert, for maximum "H" > 3.7 m (12'). Dimensions "L", "W", "H", "M", "N", "Angle of flare", and end "Slope" (as apply) are shown on the plans.

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION **PIPE CULVERT HEADWALLS, ENDWALLS AND WARPED WINGWALLS**

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NO SCALE

D86BA

DIST COUNTY ROUTE KILOMETER POST SHEET TOTAL
TOTAL PROJECT NO. SHEETS

Paul Cotter
REGISTERED CIVIL ENGINEER

July 1, 2002
PLANS APPROVAL DATE

PAUL COTTER
REGISTERED PROFESSIONAL ENGINEER
No. C34509
Exp. 9-30-03
STATE OF CALIFORNIA

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Caltrans now has a web site! To go to the web site, go to <http://www.dot.ca.gov>

PART LONGITUDINAL SECTION

TYPICAL FOR MAXIMUM "H" > 3.0 m (10') TYPICAL FOR MAXIMUM "H" < 3.0 m (10')

END ELEVATION

WALL DIMENSIONS AND REINFORCING									
Element	Slope	"H"	2.4 m (8') or less	3.0 m (10')	3.7 m (12')	4.3 m (14')	4.9 m (16')	5.5 m (18')	6.1 m (20')
4:1 (1/4:1)	Front face Reinf		#13M (#4) @ 300 mm (12")	#13M (#4) @ 300 mm (12")	#16M (#5) @ 175 mm (7")	#16M (#5) @ 175 mm (7")	#19M (#6) @ 150 mm (6")	#22M (#7) @ 150 mm (6")	#22M (#7) @ 150 mm (6")
	Rear face Reinf		#13M (#4) @ 300 mm (12")	#13M (#4) @ 300 mm (12")	#13M (#4) @ 300 mm (12")	#13M (#4) @ 300 mm (12")	#13M (#4) @ 300 mm (12")	#13M (#4) @ 300 mm (12")	#13M (#4) @ 300 mm (12")
4:3 (7/4:1)	Front face Reinf		#13M (#4) @ 300 mm (12")	#13M (#4) @ 300 mm (12")	#13M (#4) @ 300 mm (12")	#13M (#4) @ 300 mm (12")	#13M (#4) @ 300 mm (12")	#13M (#4) @ 300 mm (12")	#13M (#4) @ 300 mm (12")
	Rear face Reinf		#13M (#4) @ 300 mm (12")	#13M (#4) @ 300 mm (12")	#13M (#4) @ 300 mm (12")	#13M (#4) @ 300 mm (12")	#13M (#4) @ 300 mm (12")	#13M (#4) @ 300 mm (12")	#13M (#4) @ 300 mm (12")
4:5 (11/4:1)	Front face Reinf		#13M (#4) @ 300 mm (12")	#13M (#4) @ 300 mm (12")	#13M (#4) @ 300 mm (12")	#13M (#4) @ 300 mm (12")	#13M (#4) @ 300 mm (12")	#13M (#4) @ 300 mm (12")	#13M (#4) @ 300 mm (12")
	Rear face Reinf		#13M (#4) @ 300 mm (12")	#13M (#4) @ 300 mm (12")	#13M (#4) @ 300 mm (12")	#13M (#4) @ 300 mm (12")	#13M (#4) @ 300 mm (12")	#13M (#4) @ 300 mm (12")	#13M (#4) @ 300 mm (12")
"D" at Cutoff Wall mm (in)			150 mm (6")	150 mm (6")	150 mm (6")	150 mm (6")	150 mm (6")	150 mm (6")	150 mm (6")
"D" at Culvert mm (in)			150 mm (6")	150 mm (6")	150 mm (6")	150 mm (6")	150 mm (6")	150 mm (6")	150 mm (6")

STIFFENING BEAM DIMENSIONS AND REINFORCING									
"H" Max	"L"	3.7 m (12')	4.3 m (14')	4.9 m (16')	5.5 m (18')	6.1 m (20')	6.7 m (22')	7.3 m (24')	7.9 m (26')
1.8 m (6')	No beam, Place 2-#19M (#6) in each face along top of wall								
2.4 m (8')									
3.0 m (10')									
3.7 m (12')									
4.3 m (14')									
4.9 m (16')									
5.5 m (18')									
6.1 m (20')									

NOTES:
Walls designed for 600 mm (2') surcharge; earth density = 1900 kg/m³ (120LB/CU FT); equivalent fluid pressure = 5.66 KPa/m (36LB/CU FT).
Vary "D" of warped wall uniformly from that at cutoff wall to that at culvert, for maximum "H" > 3.7 m (12'). Dimensions "L", "W", "H", "M", "N", "Elevation "a", "Angle of flare" and "Slope" (as apply) are shown on the plans.

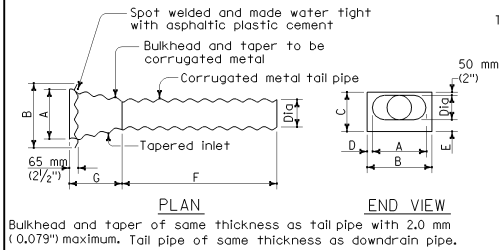
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**ARCH CULVERT
HEADWALLS, ENDWALLS
AND WARPED WINGWALLS**

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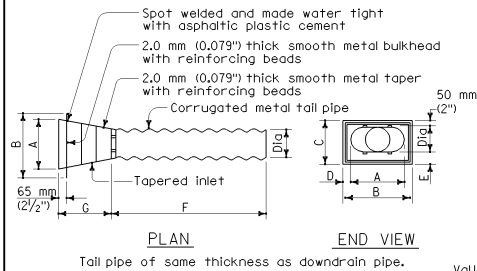
NO SCALE

D86C

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**ENTRANCE TAPER - TYPE 1
ALTERNATIVE A**

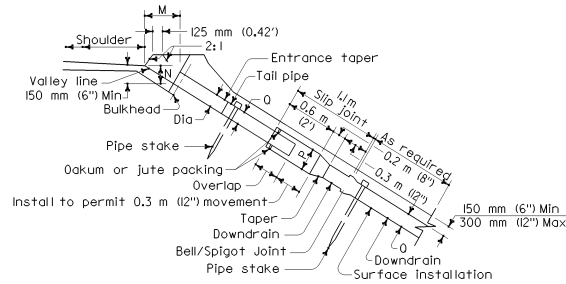


**ENTRANCE TAPER - TYPE 1
ALTERNATIVE B**

CMP dimensions as tabulated below

P	250 mm (10")	375 mm (15")	450 mm (18")	525 mm (21")	600 mm (24")	675 mm (27")	750 mm (30")	825 mm (33")	900 mm (36")	975 mm (39")	1050 mm (42")	1125 mm (45")	1200 mm (48")	1275 mm (51")	1350 mm (54")	1425 mm (57")	1500 mm (60")	1575 mm (63")	1650 mm (66")	1725 mm (69")	1800 mm (72")	1875 mm (75")	1950 mm (78")	2025 mm (81")	2100 mm (84")	2175 mm (87")	2250 mm (90")	2325 mm (93")	2400 mm (96")	2475 mm (99")	2550 mm (102")	2625 mm (105")	2700 mm (108")	2775 mm (111")	2850 mm (114")	2925 mm (117")	3000 mm (120")	3075 mm (123")	3150 mm (126")	3225 mm (129")	3300 mm (132")	3375 mm (135")	3450 mm (138")	3525 mm (141")	3600 mm (144")	3675 mm (147")	3750 mm (150")	3825 mm (153")	3900 mm (156")	3975 mm (159")	4050 mm (162")	4125 mm (165")	4200 mm (168")	4275 mm (171")	4350 mm (174")	4425 mm (177")	4500 mm (180")	4575 mm (183")	4650 mm (186")	4725 mm (189")	4800 mm (192")	4875 mm (195")	4950 mm (198")	5025 mm (201")	5100 mm (204")	5175 mm (207")	5250 mm (210")	5325 mm (213")	5400 mm (216")	5475 mm (219")	5550 mm (222")	5625 mm (225")	5700 mm (228")	5775 mm (231")	5850 mm (234")	5925 mm (237")	6000 mm (240")	6075 mm (243")	6150 mm (246")	6225 mm (249")	6300 mm (252")	6375 mm (255")	6450 mm (258")	6525 mm (261")	6600 mm (264")	6675 mm (267")	6750 mm (270")	6825 mm (273")	6900 mm (276")	6975 mm (279")	7050 mm (282")	7125 mm (285")	7200 mm (288")	7275 mm (291")	7350 mm (294")	7425 mm (297")	7500 mm (300")	7575 mm (303")	7650 mm (306")	7725 mm (309")	7800 mm (312")	7875 mm (315")	7950 mm (318")	8025 mm (321")	8100 mm (324")	8175 mm (327")	8250 mm (330")	8325 mm (333")	8400 mm (336")	8475 mm (339")	8550 mm (342")	8625 mm (345")	8700 mm (348")	8775 mm (351")	8850 mm (354")	8925 mm (357")	9000 mm (360")	9075 mm (363")	9150 mm (366")	9225 mm (369")	9300 mm (372")	9375 mm (375")	9450 mm (378")	9525 mm (381")	9600 mm (384")	9675 mm (387")	9750 mm (390")	9825 mm (393")	9900 mm (396")	9975 mm (399")	10050 mm (402")	10125 mm (405")	10200 mm (408")	10275 mm (411")	10350 mm (414")	10425 mm (417")	10500 mm (420")	10575 mm (423")	10650 mm (426")	10725 mm (429")	10800 mm (432")	10875 mm (435")	10950 mm (438")	11025 mm (441")	11100 mm (444")	11175 mm (447")	11250 mm (450")	11325 mm (453")	11400 mm (456")	11475 mm (459")	11550 mm (462")	11625 mm (465")	11700 mm (468")	11775 mm (471")	11850 mm (474")	11925 mm (477")	12000 mm (480")	12075 mm (483")	12150 mm (486")	12225 mm (489")	12300 mm (492")	12375 mm (495")	12450 mm (498")	12525 mm (501")	12600 mm (504")	12675 mm (507")	12750 mm (510")	12825 mm (513")	12900 mm (516")	12975 mm (519")	13050 mm (522")	13125 mm (525")	13200 mm (528")	13275 mm (531")	13350 mm (534")	13425 mm (537")	13500 mm (540")	13575 mm (543")	13650 mm (546")	13725 mm (549")	13800 mm (552")	13875 mm (555")	13950 mm (558")	14025 mm (561")	14100 mm (564")	14175 mm (567")	14250 mm (570")	14325 mm (573")	14400 mm (576")	14475 mm (579")	14550 mm (582")	14625 mm (585")	14700 mm (588")	14775 mm (591")	14850 mm (594")	14925 mm (597")	15000 mm (600")	15075 mm (603")	15150 mm (606")	15225 mm (609")	15300 mm (612")	15375 mm (615")	15450 mm (618")	15525 mm (621")	15600 mm (624")	15675 mm (627")	15750 mm (630")	15825 mm (633")	15900 mm (636")	15975 mm (639")	16050 mm (642")	16125 mm (645")	16200 mm (648")	16275 mm (651")	16350 mm (654")	16425 mm (657")	16500 mm (660")	16575 mm (663")	16650 mm (666")	16725 mm (669")	16800 mm (672")	16875 mm (675")	16950 mm (678")	17025 mm (681")	17100 mm (684")	17175 mm (687")	17250 mm (690")	17325 mm (693")	17400 mm (696")	17475 mm (699")	17550 mm (702")	17625 mm (705")	17700 mm (708")	17775 mm (711")	17850 mm (714")	17925 mm (717")	18000 mm (720")	18075 mm (723")	18150 mm (726")	18225 mm (729")	18300 mm (732")	18375 mm (735")	18450 mm (738")	18525 mm (741")	18600 mm (744")	18675 mm (747")	18750 mm (750")	18825 mm (753")	18900 mm (756")	18975 mm (759")	19050 mm (762")	19125 mm (765")	19200 mm (768")	19275 mm (771")	19350 mm (774")	19425 mm (777")	19500 mm (780")	19575 mm (783")	19650 mm (786")	19725 mm (789")	19800 mm (792")	19875 mm (795")	19950 mm (798")	20025 mm (801")	20100 mm (804")	20175 mm (807")	20250 mm (810")	20325 mm (813")	20400 mm (816")	20475 mm (819")	20550 mm (822")	20625 mm (825")	20700 mm (828")	20775 mm (831")	20850 mm (834")	20925 mm (837")	21000 mm (840")	21075 mm (843")	21150 mm (846")	21225 mm (849")	21300 mm (852")	21375 mm (855")	21450 mm (858")	21525 mm (861")	21600 mm (864")	21675 mm (867")	21750 mm (870")	21825 mm (873")	21900 mm (876")	21975 mm (879")	22050 mm (882")	22125 mm (885")	22200 mm (888")	22275 mm (891")	22350 mm (894")	22425 mm (897")	22500 mm (900")	22575 mm (903")	22650 mm (906")	22725 mm (909")	22800 mm (912")	22875 mm (915")	22950 mm (918")	23025 mm (921")	23100 mm (924")	23175 mm (927")	23250 mm (930")	23325 mm (933")	23400 mm (936")	23475 mm (939")	23550 mm (942")	23625 mm (945")	23700 mm (948")	23775 mm (951")	23850 mm (954")	23925 mm (957")	24000 mm (960")	24075 mm (963")	24150 mm (966")	24225 mm (969")	24300 mm (972")	24375 mm (975")	24450 mm (978")	24525 mm (981")	24600 mm (984")	24675 mm (987")	24750 mm (990")	24825 mm (993")	24900 mm (996")	24975 mm (999")	25050 mm (1002")	25125 mm (1005")	25200 mm (1008")	25275 mm (1011")	25350 mm (1014")	25425 mm (1017")	25500 mm (1020")	25575 mm (1023")	25650 mm (1026")	25725 mm (1029")	25800 mm (1032")	25875 mm (1035")	25950 mm (1038")	26025 mm (1041")	26100 mm (1044")	26175 mm (1047")	26250 mm (1050")	26325 mm (1053")	26400 mm (1056")	26475 mm (1059")	26550 mm (1062")	26625 mm (1065")	26700 mm (1068")	26775 mm (1071")	26850 mm (1074")	26925 mm (1077")	27000 mm (1080")	27075 mm (1083")	27150 mm (1086")	27225 mm (1089")	27300 mm (1092")	27375 mm (1095")	27450 mm (1098")	27525 mm (1101")	27600 mm (1104")	27675 mm (1107")	27750 mm (1110")	27825 mm (1113")	27900 mm (1116")	27975 mm (1119")	28050 mm (1122")	28125 mm (1125")	28200 mm (1128")	28275 mm (1131")	28350 mm (1134")	28425 mm (1137")	28500 mm (1140")	28575 mm (1143")	28650 mm (1146")	28725 mm (1149")	28800 mm (1152")	28875 mm (1155")	28950 mm (1158")	29025 mm (1161")	29100 mm (1164")	29175 mm (1167")	29250 mm (1170")	29325 mm (1173")	29400 mm (1176")	29475 mm (1179")	29550 mm (1182")	29625 mm (1185")	29700 mm (1188")	29775 mm (1191")	29850 mm (1194")	29925 mm (1197")	30000 mm (1200")	30075 mm (1203")	30150 mm (1206")	30225 mm (1209")	30300 mm (1212")	30375 mm (1215")	30450 mm (1218")	30525 mm (1221")	30600 mm (1224")	30675 mm (1227")	30750 mm (1230")	30825 mm (1233")	30900 mm (1236")	30975 mm (1239")	31050 mm (1242")	31125 mm (1245")	31200 mm (1248")	31275 mm (1251")	31350 mm (1254")	31425 mm (1257")	31500 mm (1260")	31575 mm (1263")	31650 mm (1266")	31725 mm (1269")	31800 mm (1272")	31875 mm (1275")	31950 mm (1278")	32025 mm (1281")	32100 mm (1284")	32175 mm (1287")	32250 mm (1290")	32325 mm (1293")	32400 mm (1296")	32475 mm (1299")	32550 mm (1302")	32625 mm (1305")	32700 mm (1308")	32775 mm (1311")	32850 mm (1314")	32925 mm (1317")	33000 mm (1320")	33075 mm (1323")	33150 mm (1326")	33225 mm (1329")	33300 mm (1332")	33375 mm (1335")	33450 mm (1338")	33525 mm (1341")	33600 mm (1344")	33675 mm (1347")	33750 mm (1350")	33825 mm (1353")	33900 mm (1356")	33975 mm (1359")	34050 mm (1362")	34125 mm (1365")	34200 mm (1368")	34275 mm (1371")	34350 mm (1374")	34425 mm (1377")	34500 mm (1380")	34575 mm (1383")	34650 mm (1386")	34725 mm (1389")	34800 mm (1392")	34875 mm (1395")	34950 mm (1398")	35025 mm (1401")	35100 mm (1404")	35175 mm (1407")	35250 mm (1410")	35325 mm (1413")	35400 mm (1416")	35475 mm (1419")	35550 mm (1422")	35625 mm (1425")	35700 mm (1428")	35775 mm (1431")	35850 mm (1434")	35925 mm (1437")	36000 mm (1440")	36075 mm (1443")	36150 mm (1446")	36225 mm (1449")	36300 mm (1452")	36375 mm (1455")	36450 mm (1458")	36525 mm (1461")	36600 mm (1464")	36675 mm (1467")	36750 mm (1470")	36825 mm (1473")	36900 mm (1476")	36975 mm (1479")	37050 mm (1482")	37125 mm (1485")	37200 mm (1488")	37275 mm (1491")	37350 mm (1494")	37425 mm (1497")	37500 mm (1500")	37575 mm (1503")	37650 mm (1506")	37725 mm (1509")	37800 mm (1512")	37875 mm (1515")	37950 mm (1518")	38025 mm (1521")	38100 mm (1524")	38175 mm (1527")	38250 mm (1530")	38325 mm (1533")	38400 mm (1536")	38475 mm (1539")	38550 mm (1542")	38625 mm (1545")	38700 mm (1548")	38775 mm (1551")	38850 mm (1554")	38925 mm (1557")	39000 mm (1560")	39075 mm (1563")	39150 mm (1566")	39225 mm (1569")	39300 mm (1572")	39375 mm (1575")	39450 mm (1578")	39525 mm (1581")	39600 mm (1584")	39675 mm (1587")	39750 mm (1590")	39825 mm (1593")	39900 mm (1596")	39975 mm (1599")	40050 mm (1602")	40125 mm (1605")	40200 mm (1608")	40275 mm (1611")	40350 mm (1614")	40425 mm (1617")	40500 mm (1620")	40575 mm (1623")	40650 mm (1626")	40725 mm (1629")	40800 mm (1632")	40875 mm (1635")	40950 mm (1638")	41025 mm (1641")	41100 mm (1644")	41175 mm (1647")	41250 mm (1650")	41325 mm (1653")	41400 mm (1656")	41475 mm (1659")	41550 mm (1662")	41625 mm (1665")	41700 mm (1668")	41775 mm (1671")	41850 mm (1674")	41925 mm (1677")	42000 mm (1680")	42075 mm (1683")	42150 mm (1686")	42225 mm (1689")	42300 mm (1692")	42375 mm (1695")	42450 mm (1698")	42525 mm (1701")	42600 mm (1704")	42675 mm (1707")	42750 mm (1710")	42825 mm (1713")	42900 mm (1716")	42975 mm (1719")	43050 mm (1722")	43125 mm (1725")	43200 mm (1728")	43275 mm (1731")	43350 mm (1734")	43425 mm (1737")	43500 mm (1740")	43575 mm (1743")	43650 mm (1746")	43725 mm (1749")	43800 mm (1752")	43875 mm (1755")	43950 mm (1758")	44025 mm (1761")	44100 mm (1764")	44175 mm (1767")	44250 mm (1770")	44325 mm (1773")	44400 mm (1776")	44475 mm (1779")	44550 mm (1782")	44625 mm (1785")	44700 mm (1788")	44775 mm (1791")	44850 mm (1794")	44925 mm (1797")	45000 mm (1800")	45075 mm (1803")	45150 mm (1806")	45225 mm (1809")	45300 mm (1812")	45375 mm (1815")	45450 mm (1818")	45525 mm (1821")	45600 mm (1824")	45675 mm (1827")	45750 mm (1830")	45825 mm (1833")	45900 mm (1836")	45975 mm (1839")	46050 mm (1842")	46125 mm (1845")	46200 mm (1848")	46275 mm (1851")	46350 mm (1854")	46425 mm (1857")	46500 mm (1860")	46575 mm (1863")	46650 mm (1866")	46725 mm (1869")	46800 mm (1872")	46875 mm (1875")	46950 mm (1878")	47025 mm (1881")	47100 mm (1884")	47175 mm (1887")	47250 mm (1890")	47325 mm (1893")	47400 mm (1896")	47475 mm (1899")	47550 mm (1902")	47625 mm (1905")	47700 mm (1908")	47775 mm (1911")	47850 mm (1914")	47925 mm (1917")	48000 mm (1920")	48075 mm (1923")	48150 mm (1926")	48225 mm (1929")	48300 mm (1932")	48375 mm (1935")	48450 mm (1938")	48525 mm (1941")	48600 mm (1944")	48675 mm (1947")	48750 mm (1950")	48825 mm (1953")	48900 mm (1956")	48975 mm (1959")	49050 mm (1962")	49125 mm (1965")	49200 mm (1968")	49275 mm (1971")	49350 mm (1974")	49425 mm (1977")	49500 mm (1980")	49575 mm (1983")	49650 mm (1986")	49725 mm (1989")	49800 mm (1992")	49875 mm (1995")	49950 mm (1998")	50025 mm (2001")	50100 mm (2004")	50175 mm (2007")	50250 mm (2010")	50325 mm (2013")	50400 mm (2016")	50475 mm (2019")	50550 mm (2022")	50625 mm (2025")	50700 mm (2028")	50775 mm (2031")	50850 mm (2034")	50925 mm (2037")	51000 mm (2040")	51075 mm (2
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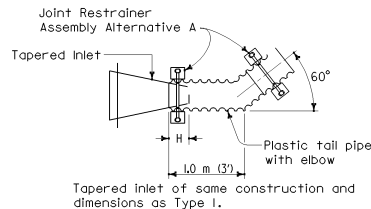
PLAN END VIEW
ENTRANCE TAPER - TYPE I



SECTION (TYPE I)

NOTE:

1. Cable or slip joint to be used when specified.
2. Slip joint to be omitted when completely buried.



ENTRANCE TAPER - TYPE 2

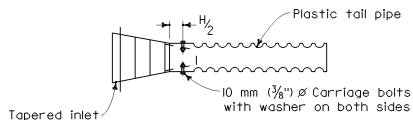
Plastic Pipe dimensions as tabulated below

P	250 mm (0°)	375 mm (5°)	450 mm (8°)	525 mm (8°)	675 mm (27°)
Q	200 mm (8°)	300 mm (12°)	375 mm (15°)	450 mm (18°)	600 mm (24°)

Taper joints may be welded or riveted.
Dimensions to be as tabulated below

DIA		B		C		D		E		F		G		H	
200 mm (8")	410 mm (16")	650 mm (25 1/2")	380 mm (15")	120 mm (4 3/4")	130 mm (5")	1.8 m (6')	0.6 m (2')	300 mm (12")							
300 mm (12")	460 mm (18")	750 mm (29 1/2")	485 mm (19 1/4")	95 mm (3 3/4")	135 mm (5 1/4")	1.8 m (6')	0.6 m (2')	300 mm (12")							
375 mm (15")	540 mm (21")	750 mm (29 1/2")	585 mm (23")	115 mm (4 1/2")	160 mm (6 3/8")	1.8 m (6')	0.6 m (2')	350 mm (14")							
450 mm (18")	610 mm (24")	860 mm (33 7/8")	685 mm (27")	125 mm (5")	185 mm (7 3/8")	1.8 m (6')	0.6 m (2')	400 mm (16")							
500 mm (20")	870 mm (34")	1100 mm (43 3/8")	890 mm (35")	150 mm (6")	240 mm (9 3/4")	1.2 m (4')	1.2 m (4')	450 mm (18")							

ENTRANCE TAPER - TYPE I

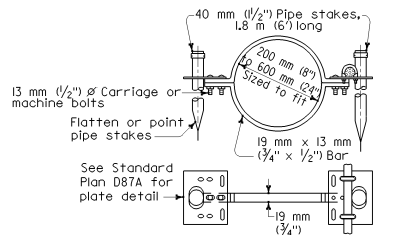


PLAN

Alternative tail pipe to entrance pipe connection

DETAIL A

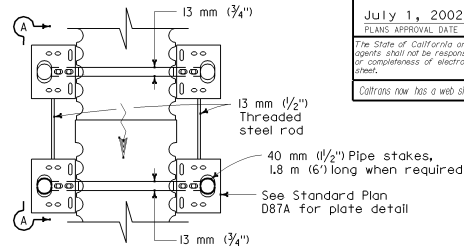
(See Note 7)



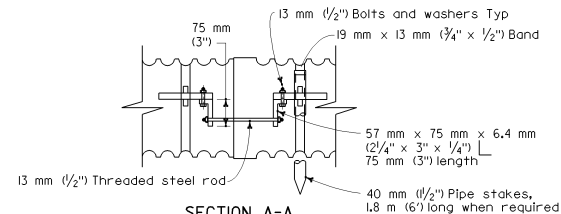
PLASTIC PIPE

JOINT RESTRAINER ASSEMBLY

Alternative A



PLAN



SECTION A-A
PLASTIC PIPE

JOINT RESTRAINER ASSEMBLY

Alternative B

NOTES:

1. All hardware to be galvanized after fabrication. All pipe stakes to be either galvanized after fabrication, or be fabricated from pre-galvanized pipe. If pre-galvanized pipe is used, weld areas shall be cleaned, and painted with zinc-rich primer.
2. See Standard Plan D87A for details of entrance taper placement at dike.
3. Pipe stakes to be used with joint restrainer when specified.
4. Plastic pipe and fittings used for overside drains shall be from one manufacturer for each installation.
5. Entrance taper: "H" dimension is length of insertion of metal taper into plastic pipe.
6. For cable anchorage system details, see Standard Plan D87C.
7. At contractors option, tail pipe and tapered inlet may be supplied from manufacturer as a pre-connected unit as shown in Detail A.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PLASTIC PIPE DOWNDRAIN DETAILS

These "Standard Plans for Construction of Local Streets and Roads" contain units in two systems of measurement: International System of Units (SI or "metric") and United States Standard Measures shown in the parentheses (). The measurements expressed in the two systems are not necessarily equal or interchangeable. See the "Foreword" at the beginning of this publication.

NO SCALE

D87B

DIST	COUNTY	ROUTE	KILOMETER TOTAL	POST PROJECT	SHEET NO.	TOTAL SHEETS

Glenn DeCou
 REGISTERED CIVIL ENGINEER

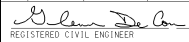
July 1, 2002

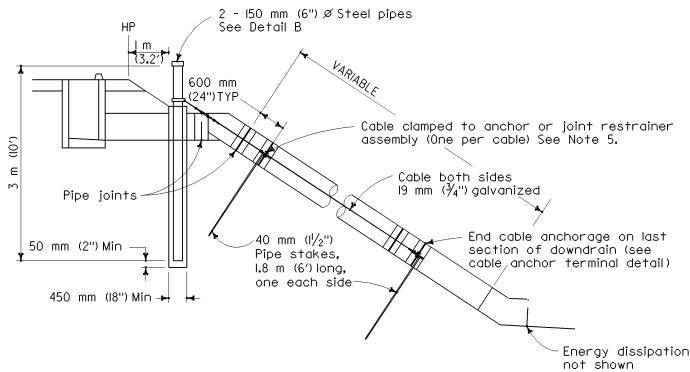
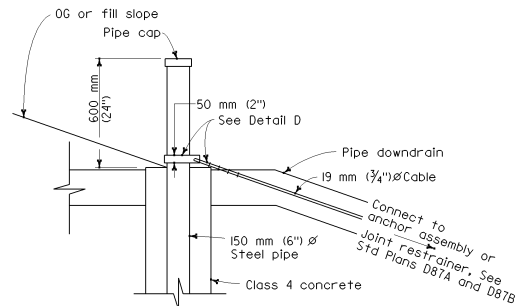
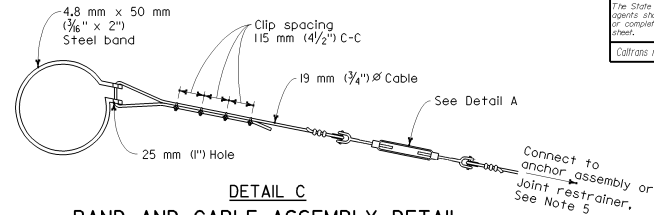
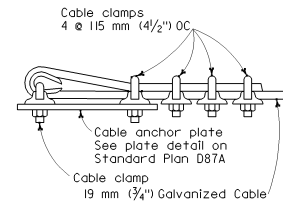
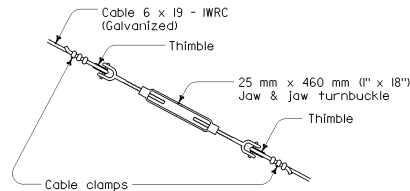
PLANS APPROVAL DATE

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REGISTERED PROFESSIONAL ENGINEER
 No. C24547
 Exp. 9-30-03
 CIVIL
 STATE OF CALIFORNIA

DIST.	COUNTY	ROUTE	KILOMETER TOTAL PROJECT	POST NO.	SHEET NO.	TOTAL SHEETS
 REGISTERED CIVIL ENGINEER No. C24541 State of California						
July 1, 2002 PLANS APPROVAL DATE						
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**CABLE ANCHORAGE SYSTEM****DETAIL B****STEEL PIPE PILE DETAILS
FOR CABLE ANCHORAGE SYSTEM****DETAIL C
BAND AND CABLE ASSEMBLY DETAIL
FOR CABLE ANCHORAGE SYSTEM****CABLE ANCHOR TERMINAL DETAIL****DETAIL A****NOTES:**

1. All hardware to be galvanized after fabrication. All pipe stakes to be either galvanized after fabrication, or be fabricated from pre-galvanized pipe. If pre-galvanized pipe is used, weld areas shall be cleaned, and painted with zinc-rich primer.
2. Diameter of downdrain 600 mm (24 inch) maximum.
3. 19 mm (3/4 inch) cable shown, 13 mm (1/2 inch) cable is allowable for pipe downdrain diameters of 200 mm to 375 mm (8 inch x 15 inch).
4. Slip joints not shown.
5. See Standard Plan D87A for Corrugated Metal Pipe Downdrain Anchor Assembly. See Standard Plan D87B for Plastic Pipe Joint Restrainer Assembly.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**CABLE ANCHORAGE
SYSTEM**

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NO SCALE

D87C

[Return to Table of Contents](#)

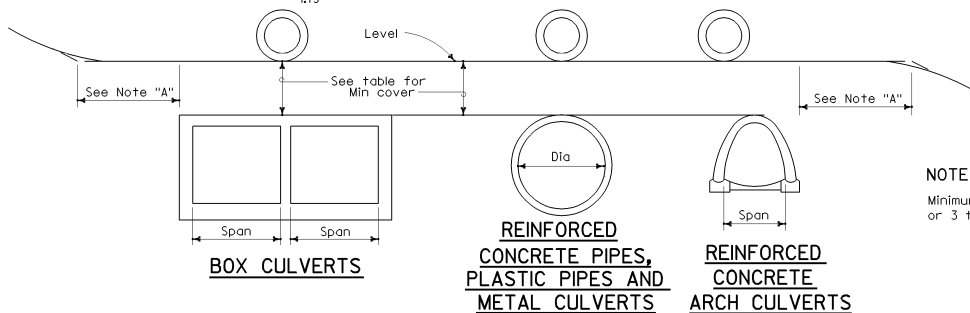
TABLE OF MINIMUM COVER AND STRUTTING REQUIREMENTS FOR CONSTRUCTION LOADS

	TYPE				80-222 kN (18-50 k) AXLE		222-334 kN (50-75 k) AXLE		334-489 kN (75-110 k) AXLE		489-667 kN (110-150 k) AXLE	
	MAXIMUM DESIGN FILL	SPAN	CEIS	MIN COVER	STRUTS REQUIRED	STRUT SIZE AND SPACING	STRUTS REQUIRED	STRUT SIZE AND SPACING	STRUTS REQUIRED	STRUT SIZE AND SPACING	STRUTS REQUIRED	STRUT SIZE AND SPACING
BOX CULVERTS	3.0 m (10') and 6.0 m (20')	1.2 m (4') to 2.4 m (8')	Single and Multiple	1.5 m (5')	—	—	—	—	—	—	—	—
	3.0 m (10')	3.0 m (10') to 4.3 m (14')	Single and Multiple	1.5 m (5')	—	—	1/3 Points	Struts 140 mm x 140 mm (6" x 6") Ø 1.0 m (3'-6") Sills 140 mm x 184 mm (6" x 8")	1/3 Points	Struts 140 mm x 184 mm (6" x 8") Ø 1.0 m (3'-6") Sills 140 mm x 184 mm (6" x 8")	1/3 Points	Struts 140 mm x 184 mm (6" x 8") Ø 1.0 m (3'-6") Sills 140 mm x 184 mm (6" x 8")
	6.0 m (20')	3.0 m (10') to 4.3 m (14')	Single and Multiple	1.5 m (5')	—	—	—	—	—	—	—	—

TABLE OF MINIMUM COVER FOR CONSTRUCTION LOADS

TYPE		DIA OR SPAN	80-222 kN (18-50k) AXLE	222-334 kN (50-75k) AXLE	334-489 kN (75-110k) AXLE	489-667 kN (110-150k) AXLE
REINFORCED CONCRETE CULVERTS	Pipes	300 mm to 1000 mm (12" to 39")	600 mm (2')	900 mm (3')	900 mm (3')	900 mm (3')
		Dia 1050 mm to 2700 mm (42" to 108")	Dia 1.75 or 900 mm (3')	Dia 1.75 or 900 mm (3')	Dia 1.75 or 900 mm (3')	Dia 1.75 or 900 mm (3')
	Arches	Spans to 4.3 m (14')	Span 2.5 or 1.2 m (4')	Span 2.5 or 1.2 m (4')	Span 2.5 or 1.2 m (4')	Span 2.5 or 1.2 m (4')
		Spans 4.6 m to 6.7 m (15' to 22')	Span 3.5 or 1.8 m (6')	Span 3.5 or 1.8 m (6')	Span 3.5 or 1.8 m (6')	Span 3.5 or 1.8 m (6')
METAL CULVERTS	Pipes	Dia to 3000 mm (120")	Dia 1.75 or 1.2 m (4')	Dia 1.75 or 1.2 m (4')	Dia 1.75 or 1.2 m (4')	Dia 1.75 or 1.2 m (4')
		Dia over 3000 mm (120")	Dia 3 or 1.8 m (6')	Dia 3 or 1.8 m (6')	Dia 3 or 1.8 m (6')	Dia 3 or 1.8 m (6')
	Pipe Arches	All Spans	Span 3 or 1.2 m (4')	Span 3 or 1.2 m (4')	Span 3 or 1.2 m (4')	Span 3 or 1.2 m (4')
	Structural Plate Pipe, Arches and Vehicular Undercrossings	All Spans	Span 3 or 1.5 m (5')	Span 3 or 1.5 m (5')	Span 3 or 1.5 m (5')	Span 3 or 1.5 m (5')
Plastic Pipe		300 mm to 1200 mm (12" to 48")	Dia 1.75 or 1.2 m (4')	Dia 1.75 or 1.2 m (4')	Dia 1.75 or 1.2 m (4')	Dia 1.75 or 1.2 m (4')

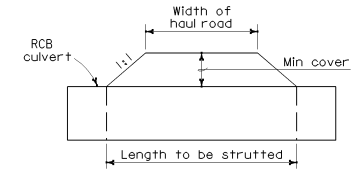
NOTE: Minimum cover shall be the greater value of alternatives shown. The diameter and spans shown in the table to calculate the minimum cover (Example: $\frac{\text{Dia}}{1.75}$) are the diameter or span of the facility expressed in number of meters (feet).



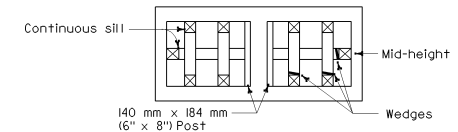
NOTE "A":

Minimum distance equals 3 times the span or 3 times the diameter.

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
<p><i>Paul Cotter</i> REGISTERED CIVIL ENGINEER</p> <p>July 1, 2002 PLANS APPROVAL DATE</p> <p>The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.</p> <p>Caltrans now has a web site! To get to the web site, go to http://www.dist.ca.gov</p>					
<p>PAUL COTTER PROFESSIONAL ENGINEER No. C34509 Exp. 9-30-03 TYP STATE OF CALIFORNIA</p>					



MINIMUM LENGTH OF STRUTTING



RCB STRUTTING DETAILS

NOTES:

Length of strutting to be determined by the Engineer, but shall not be less than as shown in the sketch above.

Assumed tire patterns:

222 kN (50 k) axle	610x460 mm (2.0' x 1.5')
334 kN (75 k) axle	910x610 mm (3.0' x 2.0')
489 kN (110 k) axle	910x760 mm (3.0' x 2.5')
667 kN (150 k) axle	910x910 mm (3.0' x 3.0')

Impact = 10%

Sills to be glue-laminated or solid timber.

For strutting requirements of Structural Steel Plate Vehicular Undercrossing, Structural Steel Plate Arches and Structural Steel Plate Pipes during construction, see Standard Plans D88A.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
CONSTRUCTION LOADS ON CULVERTS

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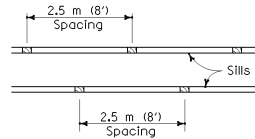
NO SCALE

D88

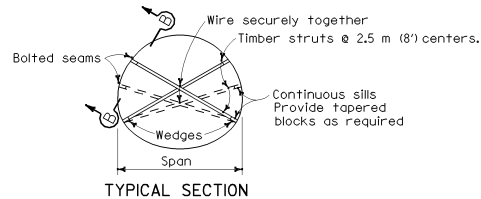
TABLE B

TIMBER STRUTS FOR STRUCTURAL STEEL PLATE VEHICULAR UNDERCROSSING		
SPAN	STRUT SIZE	SILL SIZE
4013 mm - 4724 mm (13'-2" - 15'-6")	89 mm x 89 mm (4" x 4")	89 mm x 140 mm (4" x 6")
4800 mm - 5258 mm (15'-9" - 17'-3")	89 mm x 89 mm (4" x 4")	89 mm x 184 mm (4" x 8")
Over 5258 mm (17'-3")	140 mm x 140 mm (6" x 6")	140 mm x 184 mm (6" x 8")

Tabular data in Table B based on
152 mm x 51 mm (6" x 2") corrugations,
(Structural steel plate)



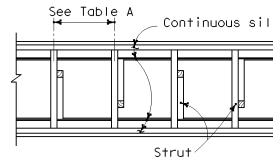
SECTION B-B



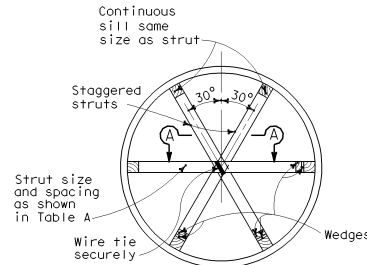
TYPICAL SECTION
**STRUCTURAL STEEL PLATE
VEHICULAR UNDERCROSSING**

TABLE A

TIMBER STRUTS FOR STRUCTURAL STEEL PLATE PIPE			
PIPE Dia	STRUT SIZE	HEIGHT OF FILL	
		0 to 6.1 m (20')	GREATER THAN 6.1 m (20')
6100 mm (240") thru	184 mm x 184 mm (8" x 8")	1.5 m (5') SPACING	1.0 m (3') SPACING
6400 mm (252")	235 mm x 235 mm (10" x 10")	2.5 m (8') SPACING	1.4 m (4.5') SPACING

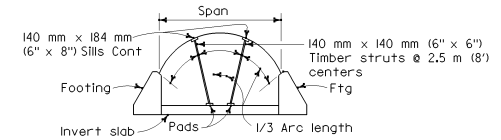


SECTION A-A



TYPICAL SECTION
STRUCTURAL STEEL PLATE PIPES

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
 REGISTERED CIVIL ENGINEER					
July 1, 2002 PLANS APPROVAL DATE					
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TYPICAL SECTION

STRUCTURAL STEEL PLATE ARCHES

Struts required when span of structural steel plate arch exceeds 5.5 m (18'). Pad size as directed by Engineer.

NOTES:

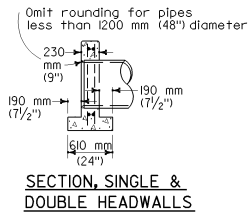
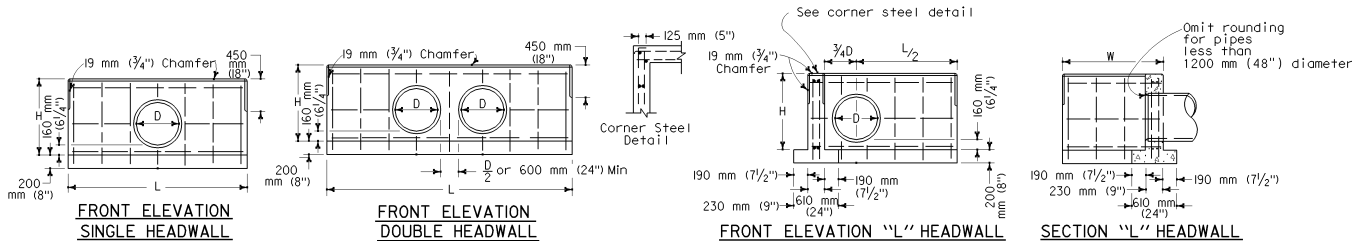
1. Struts shown are minimum required during construction and are for earth loads only.
2. Backfill shall be brought up uniformly on both sides of the structure.
3. For minimum cover over structure for construction loads, see Standard Plan D88.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**STRUT DETAILS FOR
STRUCTURAL STEEL PIPES,
ARCHES AND
VEHICULAR UNDERCROSSING**

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NO SCALE

D88A



D	H	SINGLE				DOUBLE			
		L	Steel	Conc		L	Steel	Conc	
300 mm (12")	810 mm (32")	1500 mm (5.0')	16 kg (35 lb)	0.45 m ³ (0.60 CY)		2500 mm (8.0')	24 kg (50 lb)	0.74 m ³ (0.94 CY)	
375 mm (15")	885 mm (35")	1800 mm (6.0')	18 kg (40 lb)	0.56 m ³ (0.75 CY)		2950 mm (9.5')	28 kg (60 lb)	0.91 m ³ (1.17 CY)	
450 mm (18")	960 mm (38")	2100 mm (7.0')	22 kg (50 lb)	0.68 m ³ (0.91 CY)		3250 mm (10.5')	34 kg (75 lb)	1.04 m ³ (1.35 CY)	
525 mm (21")	1035 mm (41")	2250 mm (7.5')	26 kg (60 lb)	0.76 m ³ (1.02 CY)		3550 mm (11.5')	40 kg (90 lb)	1.18 m ³ (1.52 CY)	
600 mm (24")	1110 mm (44")	2550 mm (8.5')	34 kg (75 lb)	0.90 m ³ (1.20 CY)		3850 mm (12.5')	46 kg (100 lb)	1.32 m ³ (1.72 CY)	
675 mm (27")	1185 mm (47")	2850 mm (9.5')	38 kg (85 lb)	1.04 m ³ (1.39 CY)		4300 mm (14.0')	52 kg (115 lb)	1.53 m ³ (2.00 CY)	
750 mm (30")	1260 mm (50")	3000 mm (10.0')	40 kg (85 lb)	1.13 m ³ (1.52 CY)		4600 mm (15.0')	54 kg (120 lb)	1.69 m ³ (2.21 CY)	
825 mm (33")	1335 mm (53")	3300 mm (11.0')	44 kg (100 lb)	1.29 m ³ (1.73 CY)		4900 mm (16.0')	58 kg (130 lb)	1.86 m ³ (2.42 CY)	
900 mm (36")	1410 mm (56")	3600 mm (12.0')	46 kg (105 lb)	1.46 m ³ (1.95 CY)		5200 mm (17.0')	66 kg (145 lb)	2.03 m ³ (2.65 CY)	
975 mm (39")	1485 mm (59")	3750 mm (12.5')	58 kg (130 lb)	1.57 m ³ (2.09 CY)		5500 mm (18.0')	78 kg (170 lb)	2.21 m ³ (2.88 CY)	
1050 mm (42")	1560 mm (62")	4050 mm (13.5')	62 kg (140 lb)	1.75 m ³ (2.34 CY)		5800 mm (19.0')	84 kg (185 lb)	2.39 m ³ (3.13 CY)	
1125 mm (45")	1635 mm (65")	4350 mm (14.5')	66 kg (150 lb)	1.94 m ³ (2.60 CY)		6100 mm (20.0')	88 kg (195 lb)	2.58 m ³ (3.38 CY)	
1200 mm (48")	1710 mm (68")	4500 mm (15.0')	70 kg (160 lb)	2.06 m ³ (2.75 CY)		6400 mm (21.0')	90 kg (200 lb)	2.78 m ³ (3.64 CY)	
1275 mm (51")	1785 mm (71")	4800 mm (16.0')	80 kg (180 lb)	2.26 m ³ (3.03 CY)		6850 mm (22.5')	102 kg (225 lb)	3.06 m ³ (4.02 CY)	
1350 mm (54")	1860 mm (74")	5100 mm (17.0')	84 kg (190 lb)	2.47 m ³ (3.31 CY)		7150 mm (23.5')	108 kg (240 lb)	3.27 m ³ (4.30 CY)	

STRAIGHT HEADWALLS

D	H	L/2	LENGTH OF W									
			1000 mm (40")		1450 mm (58")		1900 mm (76")		2350 mm (94")		2800 mm (112")	
			Steel	Conc	Steel	Conc	Steel	Conc	Steel	Conc	Steel	Conc
300 mm (12")	810 mm (32")	750 mm (30")	22 kg (50 lb)	0.59 m ³ (0.79 CY)	26 kg (60 lb)	0.73 m ³ (0.98 CY)	---	---	---	---	---	---
375 mm (15")	885 mm (35")	900 mm (36")	24 kg (55 lb)	0.68 m ³ (0.91 CY)	28 kg (65 lb)	0.83 m ³ (1.11 CY)	---	---	---	---	---	---
450 mm (18")	960 mm (38")	1050 mm (42")	28 kg (65 lb)	0.78 m ³ (1.04 CY)	32 kg (75 lb)	0.94 m ³ (1.25 CY)	---	---	---	---	---	---
525 mm (21")	1035 mm (41")	1125 mm (45")	32 kg (75 lb)	0.86 m ³ (1.15 CY)	40 kg (90 lb)	1.02 m ³ (1.36 CY)	---	---	---	---	---	---
600 mm (24")	1110 mm (44")	1275 mm (51")	38 kg (85 lb)	0.96 m ³ (1.29 CY)	44 kg (100 lb)	1.13 m ³ (1.51 CY)	48 kg (110 lb)	1.30 m ³ (1.74 CY)	---	---	---	---
675 mm (27")	1185 mm (47")	1425 mm (57")	40 kg (90 lb)	1.07 m ³ (1.44 CY)	46 kg (105 lb)	1.25 m ³ (1.67 CY)	50 kg (115 lb)	1.43 m ³ (1.91 CY)	---	---	---	---
750 mm (30")	1260 mm (50")	1500 mm (60")	42 kg (95 lb)	1.16 m ³ (1.55 CY)	48 kg (110 lb)	1.34 m ³ (1.80 CY)	52 kg (120 lb)	1.53 m ³ (2.05 CY)	60 kg (135 lb)	1.72 m ³ (2.29 CY)	---	---
825 mm (33")	1335 mm (53")	1650 mm (66")	46 kg (105 lb)	1.28 m ³ (1.71 CY)	52 kg (120 lb)	1.47 m ³ (1.97 CY)	60 kg (135 lb)	1.67 m ³ (2.23 CY)	66 kg (150 lb)	1.86 m ³ (2.48 CY)	---	---
900 mm (36")	1410 mm (56")	1800 mm (72")	48 kg (110 lb)	1.40 m ³ (1.88 CY)	54 kg (125 lb)	1.61 m ³ (2.15 CY)	62 kg (140 lb)	1.81 m ³ (2.41 CY)	68 kg (155 lb)	2.01 m ³ (2.68 CY)	74 kg (170 lb)	2.21 m ³ (2.95 CY)
975 mm (39")	1485 mm (59")	1875 mm (75")	---	---	66 kg (150 lb)	1.71 m ³ (2.28 CY)	74 kg (170 lb)	1.92 m ³ (2.56 CY)	80 kg (185 lb)	2.13 m ³ (2.84 CY)	88 kg (200 lb)	2.33 m ³ (3.12 CY)
1050 mm (42")	1560 mm (62")	2025 mm (81")	---	---	68 kg (155 lb)	1.85 m ³ (2.42 CY)	76 kg (175 lb)	2.07 m ³ (2.76 CY)	84 kg (190 lb)	2.28 m ³ (3.05 CY)	92 kg (210 lb)	2.50 m ³ (3.34 CY)
1125 mm (45")	1635 mm (65")	2175 mm (87")	---	---	---	---	78 kg (180 lb)	2.22 m ³ (2.97 CY)	88 kg (200 lb)	2.45 m ³ (3.27 CY)	94 kg (215 lb)	2.67 m ³ (3.57 CY)
1200 mm (48")	1710 mm (68")	2250 mm (90")	---	---	---	---	84 kg (190 lb)	2.34 m ³ (3.13 CY)	94 kg (215 lb)	2.57 m ³ (3.44 CY)	100 kg (230 lb)	2.81 m ³ (3.75 CY)
1275 mm (51")	1785 mm (71")	2400 mm (96")	---	---	---	---	---	---	96 kg (220 lb)	2.75 m ³ (3.67 CY)	102 kg (235 lb)	2.98 m ³ (3.99 CY)
1350 mm (54")	1860 mm (74")	2550 mm (102")	---	---	---	---	---	---	102 kg (235 lb)	2.92 m ³ (3.91 CY)	110 kg (250 lb)	3.17 m ³ (4.24 CY)

"L" HEADWALLS


CIRCULAR PIPE CULVERT HEADWALLS

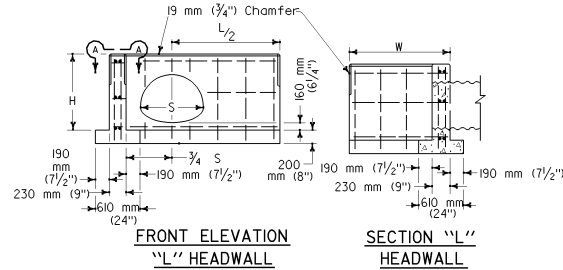
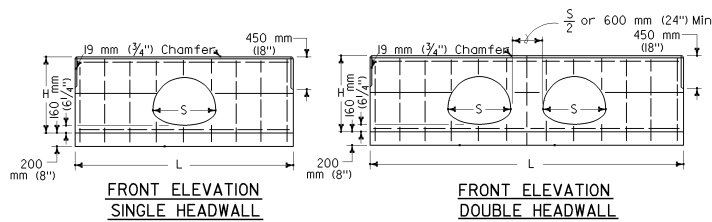
STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION PIPE HEADWALLS

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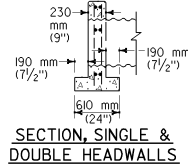
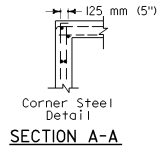
NO SCALE

D89

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
 REGISTERED CIVIL ENGINEER No. C34541 STATE OF CALIFORNIA					
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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
REGISTERED CIVIL ENGINEER July 1, 2002 PLANS APPROVAL DATE The State of California or its officers or agents shall not be responsible for the accuracy or completeness or electronic copies of this plan sheet. Caltrans now has a web site! To get to the web site, go to https://www.dot.ca.gov					



CMP ARCH SIZE	SINGLE				DOUBLE			
	H	L	Steel	Conc	L	Steel	Conc	
530 mm x 380 mm (21" x 15")	885 mm (35")	2000 mm (6.5')	20 kg (45 lb)	0.61 m ³ (0.80 CY)	3000 mm (10.0')	28 kg (60 lb)	0.91 m ³ (1.22 CY)	
610 mm x 460 mm (24" x 18")	960 mm (38")	2300 mm (7.5')	22 kg (50 lb)	0.74 m ³ (0.96 CY)	3500 mm (11.5')	32 kg (70 lb)	1.0 m ³ (1.45 CY)	
710 mm x 510 mm (28" x 20")	1010 mm (40")	2600 mm (8.5')	28 kg (60 lb)	0.85 m ³ (1.12 CY)	4100 mm (13.5')	40 kg (90 lb)	1.32 m ³ (1.76 CY)	
885 mm x 610 mm (35" x 24")	1110 mm (44")	3200 mm (10.5')	38 kg (85 lb)	1.11 m ³ (1.47 CY)	4700 mm (15.5')	54 kg (120 lb)	1.58 m ³ (2.16 CY)	
1060 mm x 740 mm (42" x 29")	1235 mm (49")	3800 mm (12.5')	50 kg (110 lb)	1.40 m ³ (1.76 CY)	5500 mm (18.0')	66 kg (145 lb)	1.95 m ³ (2.57 CY)	
1240 mm x 840 mm (49" x 33")	1335 mm (53")	4400 mm (14.5')	58 kg (130 lb)	1.70 m ³ (2.26 CY)	6400 mm (21.0')	78 kg (170 lb)	2.37 m ³ (3.13 CY)	
1440 mm x 970 mm (57" x 38")	1460 mm (58")	5200 mm (17.0')	70 kg (155 lb)	2.13 m ³ (2.81 CY)	7450 mm (24.5')	96 kg (210 lb)	2.91 m ³ (3.86 CY)	
1620 mm x 1100 mm (64" x 43")	1585 mm (63")	5800 mm (19.0')	80 kg (175 lb)	2.50 m ³ (3.31 CY)	8200 mm (27.0')	104 kg (230 lb)	3.36 m ³ (4.42 CY)	
1800 mm x 1200 mm (71" x 47")	1685 mm (67")	6400 mm (21.0')	88 kg (195 lb)	2.89 m ³ (3.81 CY)	9100 mm (30.0')	116 kg (255 lb)	3.88 m ³ (5.09 CY)	

STRAIGHT HEADWALLS

CMP ARCH SIZE	H	LENGTH OF W											
		L/2	1000 mm (40")		1450 mm (58")		1900 mm (76")		2350 mm (94")		2800 mm (112")		
			Steel	Conc	Steel	Conc	Steel	Conc	Steel	Conc	Steel	Conc	
530 mm x 380 mm (21" x 15")	885 mm (35")	1000 mm (39")	26 kg (60 lb)	0.74 m ³ (1.00 CY)	30 kg (65 lb)	0.89 m ³ (1.18 CY)	34 kg (75 lb)	1.04 m ³ (1.38 CY)	40 kg (90 lb)	1.18 m ³ (1.58 CY)	44 kg (100 lb)	1.33 m ³ (1.77 CY)	
610 mm x 460 mm (24" x 18")	960 mm (38")	1150 mm (45")	28 kg (60 lb)	0.84 m ³ (1.07 CY)	32 kg (70 lb)	1.00 m ³ (1.32 CY)	36 kg (80 lb)	1.15 m ³ (1.53 CY)	42 kg (95 lb)	1.30 m ³ (1.74 CY)	50 kg (110 lb)	1.46 m ³ (1.94 CY)	
710 mm x 510 mm (28" x 20")	1010 mm (40")	1300 mm (51")	32 kg (70 lb)	0.93 m ³ (1.26 CY)	36 kg (80 lb)	1.09 m ³ (1.47 CY)	40 kg (90 lb)	1.25 m ³ (1.68 CY)	44 kg (100 lb)	1.41 m ³ (1.90 CY)	52 kg (115 lb)	1.57 m ³ (2.11 CY)	
885 mm x 610 mm (35" x 24")	1110 mm (44")	1600 mm (63")	44 kg (100 lb)	1.13 m ³ (1.51 CY)	50 kg (110 lb)	1.30 m ³ (1.74 CY)	54 kg (120 lb)	1.47 m ³ (1.97 CY)	62 kg (140 lb)	1.64 m ³ (2.20 CY)	70 kg (155 lb)	1.81 m ³ (2.42 CY)	
1060 mm x 740 mm (42" x 29")	1235 mm (49")	1900 mm (75")	52 kg (115 lb)	1.36 m ³ (1.82 CY)	58 kg (130 lb)	1.54 m ³ (2.06 CY)	62 kg (140 lb)	1.72 m ³ (2.31 CY)	70 kg (155 lb)	1.90 m ³ (2.55 CY)	76 kg (170 lb)	2.09 m ³ (2.83 CY)	
1240 mm x 840 mm (49" x 33")	1335 mm (53")	2200 mm (87")	58 kg (130 lb)	1.58 m ³ (2.12 CY)	64 kg (145 lb)	1.77 m ³ (2.37 CY)	70 kg (155 lb)	1.96 m ³ (2.64 CY)	76 kg (170 lb)	2.16 m ³ (2.90 CY)	82 kg (185 lb)	2.35 m ³ (3.15 CY)	
1440 mm x 970 mm (57" x 38")	1460 mm (58")	2600 mm (102")	64 kg (145 lb)	1.89 m ³ (2.52 CY)	72 kg (160 lb)	2.09 m ³ (2.79 CY)	78 kg (175 lb)	2.30 m ³ (3.07 CY)	84 kg (190 lb)	2.51 m ³ (3.35 CY)	92 kg (205 lb)	2.71 m ³ (3.61 CY)	
1620 mm x 1100 mm (64" x 43")	1585 mm (63")	2900 mm (114")	84 kg (185 lb)	2.16 m ³ (2.89 CY)	90 kg (200 lb)	2.38 m ³ (3.11 CY)	96 kg (215 lb)	2.60 m ³ (3.48 CY)	104 kg (235 lb)	2.82 m ³ (3.77 CY)	112 kg (250 lb)	3.04 m ³ (4.06 CY)	
1800 mm x 1200 mm (71" x 47")	1685 mm (67")	3200 mm (126")	90 kg (200 lb)	2.44 m ³ (3.25 CY)	96 kg (215 lb)	2.66 m ³ (3.56 CY)	104 kg (235 lb)	2.89 m ³ (3.86 CY)	112 kg (250 lb)	3.12 m ³ (4.17 CY)	120 kg (270 lb)	3.35 m ³ (4.48 CY)	

"L" HEADWALLS

CORRUGATED METAL PIPE ARCH CULVERT HEADWALLS

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION PIPE HEADWALLS

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NO SCALE

D89A

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(14") (6'-6") Max

Optional footing line

Layout line

1270 mm (4'-2 1/2")

865 mm (2'-10")

965 mm (3'-2")

560 mm (1'-2")

1270 mm (4'-2 1/2")

1880 mm (6'-2")

610 mm (2'-0")

B=1270 mm (4'-2 1/2")

W=1880 mm (6'-2")

C=610 mm (2'-0")

SECTION D-D

If required, slope protection details are shown elsewhere in the road plans, or as directed by the Engineer.

Number above "b" & "c" bars indicates distance from top of footing to upper end of bars. Bar cutoffs may be varied in increments of 150 mm (6").

Unit Stresses: f_s 165 MPa (24,000 psi), f_c 9 MPa (1,300 psi), $n = 10$
Maximum Top Pressure = 44 kPa (3 k/sf).
Elevation, length and angle of flare of wings may be varied by the Engineer to suit conditions encountered.
In the field, Walls designed for 600 mm (2') live load surcharge, 1:1.5 (1/2.5) sloping surcharge not to exceed 1.5 m (5') in elevation plus 600 mm (2') live load surcharge, or unlimited 1:2 (1/2) surcharge. If 1:1.5 (1/2.5) slope exceeds 1.5 m (5') use Type 2 retaining wall. Wall height may be exceeded by 150 mm (6") before going to the next greater "H".

may be varied by the engineer to suit conditions in the field.

SECTION E-E

Technical drawing of a reinforced concrete pile cap. The drawing shows a cross-section of the cap with various dimensions and reinforcement details. Key features include:

- Dimensions:**
 - Overall height: 1.2 m (4')
 - Top section height: 150 mm (6")
 - Bottom section height: 300 mm (12")
 - Top section diameter: 0.6 Dia +150 mm (6")
 - Bottom section diameter: 300 mm (12")
 - Reinforcement spacing: 150 mm (6")
- Reinforcement:**
 - Top section: #19M (#6) Bars for concrete pipe only.
 - Bottom section: #3M (#4) bars.
 - Reinforcement shown in addition to regular wall Reinforcement.
- Other Details:**
 - Hook bolts for metal pipe.
 - Const Jt (Constant Joint).
 - Cutoff wall if required and as directed by the Engineer.
 - Additional #3M (#4) bars.

300 mm (12")

Ground line or channel slope

Use hook bolts ϕ 485 mm (19") \pm spacing, size and length provided by manufacturer for metal pipes only.

2-#19M (#6) Bars for RC pipes

0.6 Dia

Dia=1500 mm (160") or greater

ϕ 300 mm (12")

1.5 m (5') Max for 1:1.5 (1 1/2:1) Fill slopes, unlimited for slopes flatter than 1:1.5 (1 1/2:1)

13M (#4) Along top of wall
300 mm (1'-0") Max

Fill slope
305 mm (12")

Gutter or shoulder
900 mm (3'-0")

Vertical
13M (#4) @ 450 mm (18")

Short "c" bars

35 Dia

Const Jt

R=230 mm (9")

Vertical unless next a battered section then match

"c" bars

Br Det 3-l @ 4.5 m (15' centers 300 mm (12") outside ground. See Std Plan B0-3.

"d" bars

13M (#4), Total 75 mm (3") Cl
300 mm (1'-0")

200 mm (8")
200 mm (8")

W/3
C
B
W

1.5 M (5') Max for 1:1.5 (1/2:1) fill slopes, unlimited for slopes flatter than 1:1.5 (1/2:1)

300 mm (1'-0") Max

305 mm (1'-2")

Fill slope

Gutter or shoulder

900 mm (3'-0")

Vertical

#3M (#4) 450 mm (18")

#3M (#4) 900 mm (36")

Short "b" bars

Batter 99 to 4d100

"c" bars

Short "c" bars

35 Dia

Const. Jt

230 mm (9") R

"d" bars

4' 7" Total

300 mm (1'-0")

C

B

W/3

END ELEVATION
STRAIGHT WINGWALLS

TYPE B

For footing step
dimensions and reinforcement
see "Footing Step" on
Std Plan B3-8.

Std Plan B3-8.

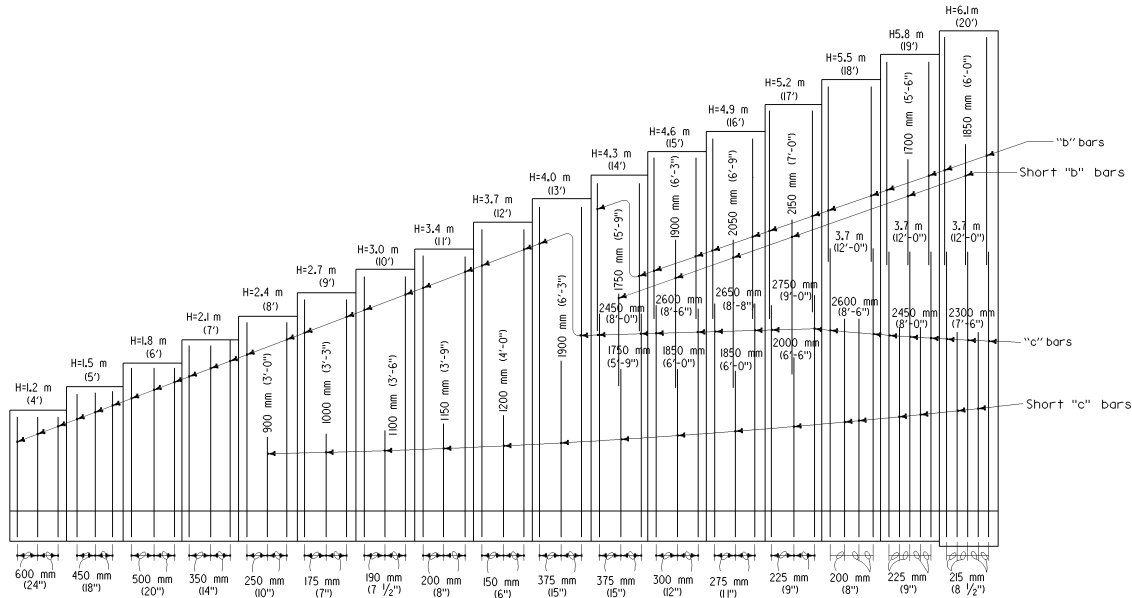
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

**PIPE CULVERT HEADWALLS,
ENDWALLS AND WINGWALLS
TYPES A, B AND C**

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NO SCALE

D90A



REINFORCED CONCRETE WINGWALLS

Design "H"	1.2 m (4')	1.5 m (5')	1.8 m (6')	2.1 m (7')	2.4 m (8')	2.7 m (9')	3.0 m (10')	3.4 m (11')	3.7 m (12')	4.0 m (13')	4.3 m (14')	4.6 m (15')	4.9 m (16')	5.2 m (17')	5.5 m (18')	5.8 m (19')	6.1 m (20')
W	965 mm (3'-2")	1120 mm (3'-8")	1270 mm (4'-2")	1420 mm (4'-8")	1575 mm (5'-2")	1730 mm (5'-8")	1880 mm (6'-2")	2030 mm (6'-8")	2185 mm (7'-2")	2335 mm (7'-8")	2440 mm (8'-0")	2640 mm (8'-8")	2845 mm (9'-4")	3050 mm (10'-0")	3250 mm (10'-8")	3455 mm (11'-4")	3660 mm (12'-0")
C	305 mm (1'-0")	355 mm (1'-2")	405 mm (1'-4")	455 mm (1'-6")	500 mm (1'-8")	560 mm (1'-10")	610 mm (2'-0")	660 mm (2'-2")	710 mm (2'-4")	760 mm (2'-6")	815 mm (2'-8")	915 mm (3'-0")	1015 mm (3'-4")	1120 mm (3'-8")	1220 mm (4'-0")	1320 mm (4'-4")	1425 mm (4'-8")
B	660 mm (2'-2")	765 mm (2'-6")	865 mm (2'-10")	965 mm (3'-2")	1065 mm (3'-6")	1170 mm (3'-10")	1270 mm (4'-2")	1370 mm (4'-6")	1475 mm (4'-10")	1575 mm (5'-2")	1625 mm (5'-4")	1725 mm (5'-8")	1830 mm (6'-0")	1930 mm (6'-4")	2030 mm (6'-8")	2135 mm (7'-0")	2235 mm (7'-4")
F	355 mm (1'-2")																
Batter	4:100 (1/2%)																
S	305 mm (1'-0")																
"b" bars	None																
"c" bars	*13M (*4) @ 600 mm (24")	*13M (*4) @ 450 mm (18")	*16M (*5) @ 500 mm (20")	*16M (*5) @ 350 mm (14")	*16M (*5) @ 250 mm (10")	*16M (*5) @ 175 mm (7")	*19M (*6) @ 190 mm (7 1/2")	*22M (*7) @ 200 mm (8")	*22M (*7) @ 150 mm (6")	*29M (*9) @ 375 mm (15")	*32M (*10) @ 300 mm (12")	*32M (*10) @ 275 mm (11")	*32M (*10) @ 225 mm (9")	*32M (*10) @ 200 mm (8")	*32M (*10) @ 150 mm (6")	*36M (*11) @ 215 mm (8 1/2")	*36M (*11) @ 215 mm (8 1/2")
"d" bars	*13M (*4) @ 600 mm (24")	*13M (*4) @ 450 mm (18")	*16M (*5) @ 500 mm (20")	*16M (*5) @ 350 mm (14")	*16M (*5) @ 250 mm (10")	*19M (*6) @ 350 mm (14")	*22M (*7) @ 380 mm (15")	*25M (*8) @ 400 mm (16")	*22M (*7) @ 300 mm (12")	*25M (*8) @ 375 mm (15")	*29M (*9) @ 375 mm (15")	*29M (*9) @ 300 mm (12")	*29M (*9) @ 275 mm (11")	*29M (*9) @ 225 mm (9")	*29M (*9) @ 200 mm (8")	*32M (*10) @ 225 mm (9")	*32M (*10) @ 215 mm (8 1/2")
Conc. m ³ /m (cy/lf)	0.80 (0.32)	0.95 (0.38)	1.10 (0.44)	1.23 (0.49)	1.38 (0.55)	1.53 (0.61)	1.68 (0.67)	1.83 (0.73)	1.98 (0.79)	2.56 (1.02)	2.76 (1.10)	2.96 (1.18)	3.16 (1.26)	3.41 (1.36)	3.64 (1.55)	3.89 (1.55)	4.31 (1.72)
Reinf. kg/m (lb/lf)	19 (13)	24 (16)	28 (19)	37 (25)	45 (30)	55 (37)	73 (49)	92 (62)	113 (76)	109 (73)	134 (90)	155 (104)	183 (123)	210 (141)	253 (170)	281 (189)	307 (206)

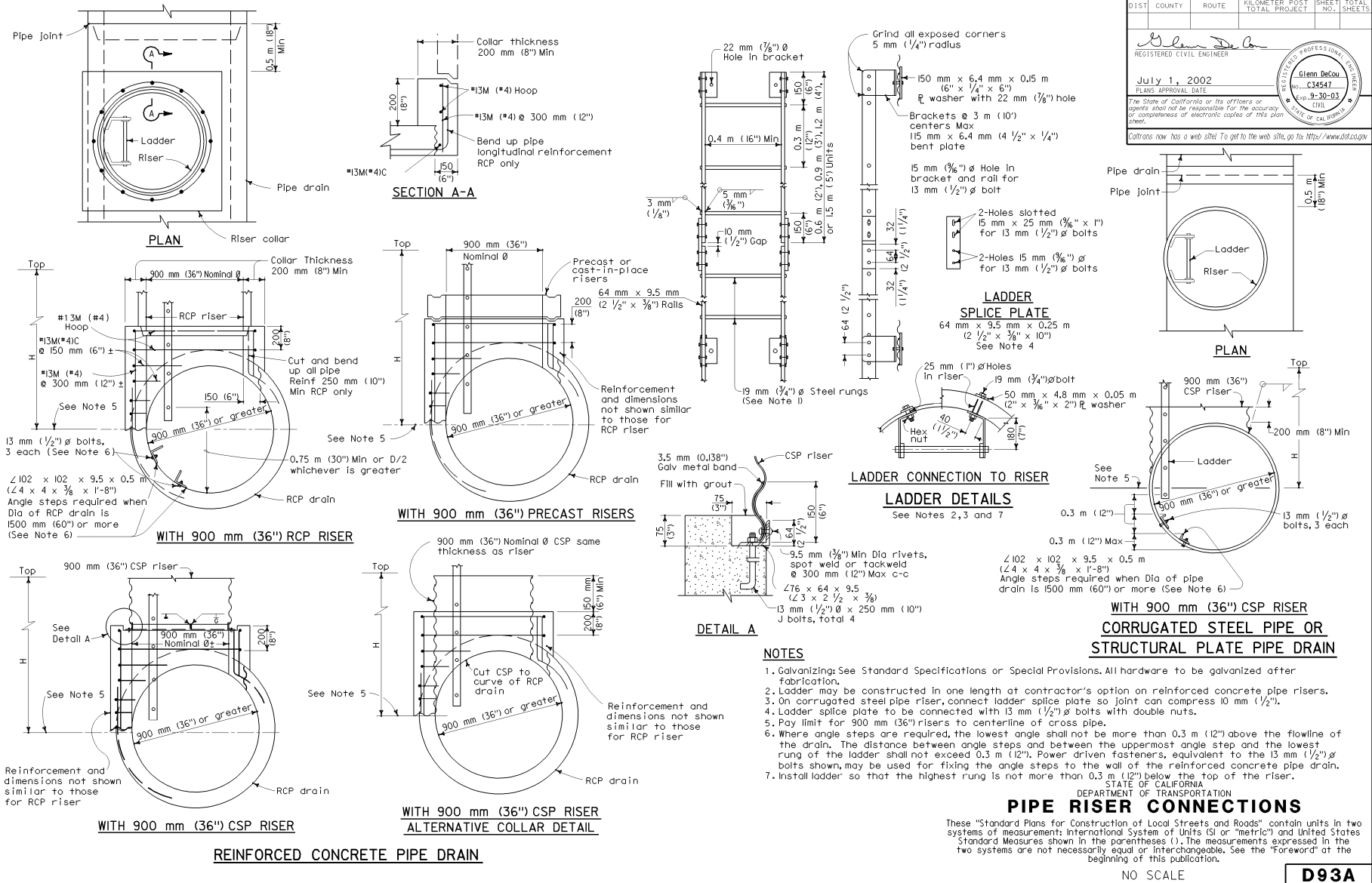
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**PIPE CULVERT HEADWALLS,
ENDWALLS AND WINGWALLS
TYPE A, B AND C**

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NO SCALE

D90B

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
<p><i>Paul Cotter</i> REGISTERED CIVIL ENGINEER</p> <p>July 1, 2002 PLANS APPROVAL DATE</p> <p>The State of California or its officers or agents shall not be responsible for the accuracy or completeness or electronic copies of this plan sheet.</p> <p>Caltrans now has a web site! To get to the web site, go to http://www.dot.ca.gov</p>					
<p>STATE OF CALIFORNIA PAUL COTTER No. C34509 Exp. 9-30-03 CIVIL ENGINEER</p>					



DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

July 1, 2002

PLANS APPROVAL DATE

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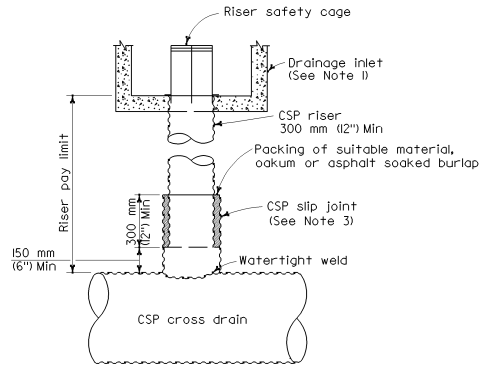
Glenn DeSou

No. C34541

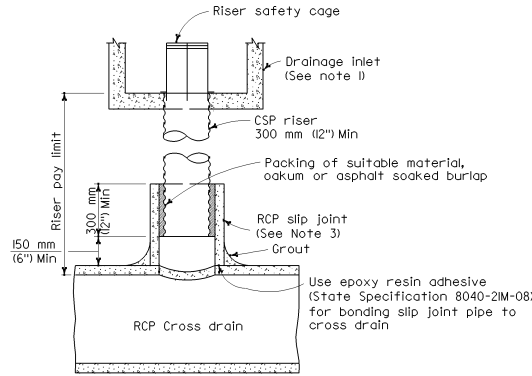
Exp. 9-30-03

STATE OF CALIFORNIA

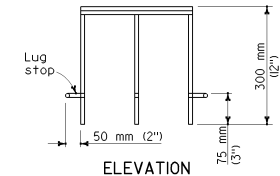
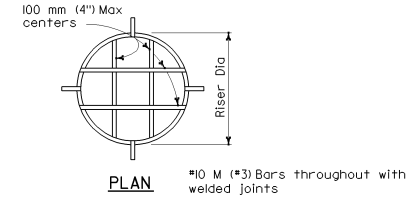
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**CSP RISER FOR
DRAINAGE INLET**



**RCP RISER FOR
DRAINAGE INLET**



RISER SAFETY CAGE DETAIL

NOTES:

1. Structure at top of riser may be any standard drainage inlet or pipe inlet
2. Galvanizing: See Standard Specifications or Special Provision.
3. Diameter of slip joint to be 75 mm (3") greater than diameter of riser.

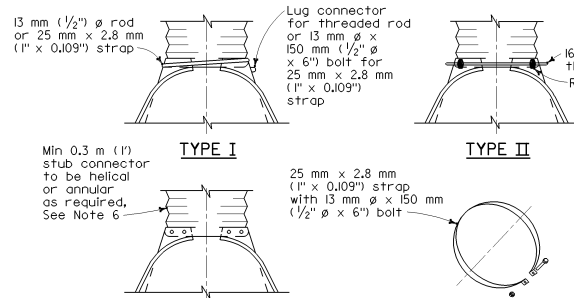
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**DRAINAGE INLET
RISER CONNECTIONS**

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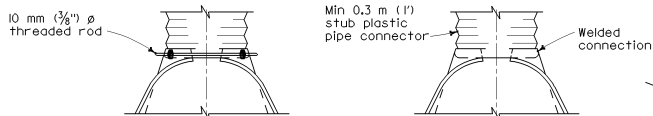
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D93B

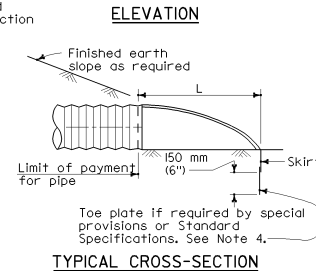
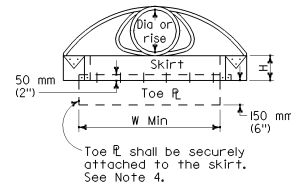
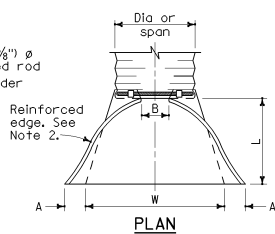
[Return to Table of Contents](#)



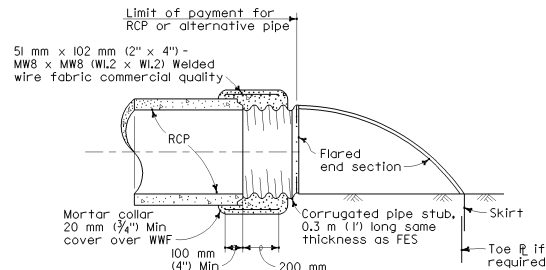
TYPE III **CONNECTOR STRAP DETAIL**
ALTERNATIVE CONNECTIONS FOR
PIPE TO METAL FLARED END SECTIONS
See Note 7



TYPE A **TYPE B**
300 mm - 600 mm (12" - 24") 750 mm - 900 mm (30" - 36")
ALTERNATIVE CONNECTIONS FOR
PIPE TO PLASTIC FLARED END SECTIONS



TYPICAL CROSS-SECTION



FLARED END SECTION CONNECTION TO RCP

NOTES

- All 3-piece bodies to have 2.8 mm (0.09") thick sides and 3.5 mm (0.138") thick center panels. Width of center panels to be greater than 20% of the pipe periphery. Multiple panel bodies to have lap seams which are to be tightly joined by rivets or bolts.
- Reinforced edges to be supplemented with stiffener angles for the 1500 mm thru 2100 mm (60" thru 84") round, 1925 mm x 1300 mm (77" x 52") and 2075 mm x 1425 mm (83" x 57") pipe-arch sizes. The angles will be 51 mm x 51 mm x 6.4 mm (2" x 2" x 1/4") for the 1500 mm thru 1800 mm (60" thru 72") round, 1925 mm x 1300 mm (77" x 52") and 2075 mm x 1425 mm (83" x 57") pipe-arch sizes and 64 mm x 64 mm x 6.4 mm (2 1/2" x 2 1/2" x 1/4") for 1950 mm (78") and 2100 mm (84") round. The angles to be attached by 10 mm (3/8") diameter nuts and bolts.
- Angle reinforcement shall be placed under the center panel seams on the 1925 mm x 1300 mm (77" x 52") and 2075 mm x 1425 mm (83" x 57") pipe-arch sizes.
- Toe plate to be available as an accessory when specified.
- End of pipe to be finished with annular corrugations to conform flared end section so that minimal leakage results from the connection. Other designs may be used with approval of the Engineer.
- For 300 mm thru 600 mm (12" thru 24") helical end section connection, a universal coupling band attached to the metal end section by rivets, bolts or 25 mm (1") long shop tack welds spaced at same intervals as dimples may be used in place of the 0.3 m (1 foot) stubs. See Standard Plan D97C.
- The types of alternative connections for pipe to metal flared end sections shall conform to the following:
CIRCULAR PIPES
300 mm thru 600 mm (12" thru 24") Type I or III
750 mm thru 2100 mm (36" thru 84") Type II or III
PIPE-ARCHES
525 mm x 375 mm thru 1425 mm x 950 mm (21" x 15" thru 57" x 38") Type II or III
1600 mm x 1075 mm thru 2075 mm x 1425 mm (64" x 43" thru 83" x 57") Type III

CIRCULAR PIPES						
PIPE DIAMETER	END SECTION THICKNESS	DIMENSION-MILLIMETERS				
		A	B	H	L	W
		±25 mm (1")	Max	±25 mm (1")	±40 mm (1½")	±50 mm (2")
*300 mm (12")	1,6 mm (0,064")	150 mm (6")	150 mm (6")	150 mm (6")	530 mm (21")	600 mm (24")
*375 mm (15")		180 mm (7")	200 mm (8")		660 mm (26")	760 mm (30")
*450 mm (18")		200 mm (8")	250 mm (10")		790 mm (31")	910 mm (36")
525 mm (21")		230 mm (9")	300 mm (12")		910 mm (36")	1070 mm (42")
*600 mm (24")	2,0 mm (0,079")	250 mm (10")	330 mm (13")	200 mm (8")	1040 mm (41")	1220 mm (48")
*750 mm (30")		300 mm (12")	410 mm (16")		1300 mm (51")	1520 mm (60")
*900 mm (36")		360 mm (14")	480 mm (19")		1520 mm (60")	1830 mm (72")
1050 mm (42")		410 mm (16")	560 mm (22")		1750 mm (69")	2130 mm (84")
1200 mm (48")	2,8 mm (0,109")	460 mm (18")	690 mm (27")	300 mm (12")	1980 mm (78")	2290 mm (90")
1350 mm (54")			760 mm (30")		2130 mm (84")	2590 mm (102")
1500 mm (60")			840 mm (33")		2210 mm (87")	2900 mm (114")
1650 mm (66")			910 mm (36")			3050 mm (120")
1800 mm (72")			990 mm (39")			3200 mm (126")
1950 mm (78")			1070 mm (42")			3350 mm (132")
2100 mm (84")			1140 mm (45")			3510 mm (138")

* Equivalent plastic FES to meet AASHTO M-294 and ASTM D-1248 Specification, and shall conform to all dimensions shown above except for end section thickness, which may be 0.1 mm (0.004") thinner.

FLARED END SECTIONS FOR CORRUGATED METAL AND PLASTIC PIPE CULVERTS

PIPE-ARCHES							
DESIGNATION		END SECTION THICKNESS	DIMENSION				
SPAN	RISE		A	B	H	L	W
			±25 mm (1")	Max	±25 mm (1")	±40 mm (1 1/2")	±50 mm (2")
525 mm (21")	375 mm (15")	1.6 mm (0.064")	180 mm (7")	250 mm (10")	150 mm (6")	580 mm (23")	910 mm (36")
600 mm (24")	450 mm (18")		200 mm (8")	300 mm (12")		710 mm (28")	1070 mm (42")
700 mm (28")	500 mm (20")		230 mm (9")	360 mm (14")		810 mm (32")	1220 mm (48")
875 mm (35")	600 mm (24")		250 mm (10")	410 mm (16")		990 mm (39")	1520 mm (60")
1050 mm (42")	725 mm (29")	2.0 mm (0.079")	300 mm (12")	460 mm (18")	200 mm (8")	1170 mm (46")	1910 mm (75")
1225 mm (49")	825 mm (33")		330 mm (13")	530 mm (21")	230 mm (9")	1350 mm (53")	2160 mm (85")
1425 mm (57")	950 mm (38")		2.8 mm (0.109")	660 mm (26")	300 mm (12")	1600 mm (63")	2290 mm (90")
1600 mm (64")	1075 mm (43")			760 mm (30")		1780 mm (70")	2590 mm (102")
1775 mm (71")	1175 mm (47")	840 mm (33")		1960 mm (77")		2900 mm (114")	
1925 mm (77")	1300 mm (52")	910 mm (36")				3200 mm (126")	
2075 mm (83")	1425 mm (57")	990 mm (39")				3510 mm (138")	


STATE OF CALIFORNIA
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**METAL AND
PLASTIC FLARED
END SECTIONS**


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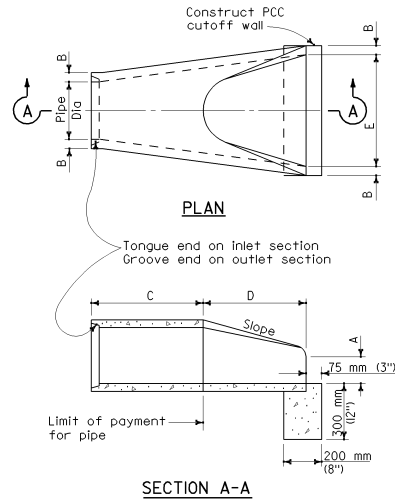
NO SCALE

D94A

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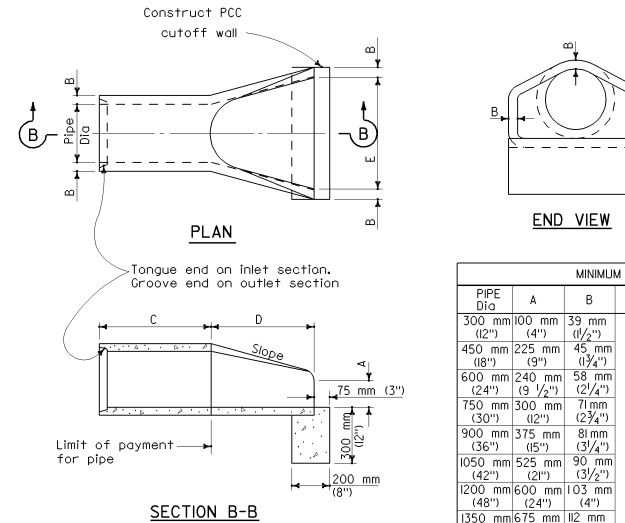


PRECAST CONCRETE FLARED END SECTION TYPE A

MINIMUM DIMENSIONS						
PIPE Dia	A	B	C	D	E	SLOPE
300 mm (12")	100 mm (4")	45 mm (1 3/4")	See Note 2	600 mm (24")	600 mm (24")	1:2 (2:1) or flatter
450 mm (18")	225 mm (9")	58 mm (2 1/4")		675 mm (27")	910 mm (36")	
600 mm (24")	240 mm (9 1/2")	70 mm (2 3/4")		1100 mm (43 1/2")	1210 mm (48")	
750 mm (30")	300 mm (12")	83 mm (3 3/4")		1370 mm (54")	1520 mm (60")	
900 mm (36")	375 mm (15")	95 mm (3 3/4")		1600 mm (63")	1820 mm (72")	
1050 mm (42")	525 mm (21")	107 mm (4 1/4")		1600 mm (63")	1980 mm (78")	
1200 mm (48")	600 mm (24")	119 mm (4 3/8")		1820 mm (72")	2130 mm (84")	
1350 mm (54")	675 mm (27")	131 mm (5 1/8")		1650 mm (65")	2080 mm (82")	

NOTES:

- Contractor has the option of using either Type A or B precast concrete flared end section.
- C dimension varies by manufacturer and will be paid for as concrete pipe.



PRECAST CONCRETE FLARED END SECTION TYPE B



MINIMUM DIMENSIONS						
PIPE Dia	A	B	C	D	E	SLOPE
300 mm (12")	100 mm (4")	39 mm (1 1/2")	See Note 2	550 mm (21 3/4")	600 mm (24")	1:2 (2:1) or flatter
450 mm (18")	225 mm (9")	45 mm (1 3/4")		630 mm (25")	910 mm (36")	
600 mm (24")	240 mm (9 1/2")	58 mm (2 1/4")		1060 mm (42")	1210 mm (48")	
750 mm (30")	300 mm (12")	71 mm (2 3/4")		1340 mm (53")	1520 mm (60")	
900 mm (36")	375 mm (15")	81 mm (3 1/4")		1570 mm (62")	1820 mm (72")	
1050 mm (42")	525 mm (21")	90 mm (3 3/2")		1600 mm (63")	1980 mm (78")	
1200 mm (48")	600 mm (24")	103 mm (4")		1820 mm (72")	2130 mm (84")	
1350 mm (54")	675 mm (27")	112 mm (4 3/8")		1670 mm (66")	2080 mm (82")	

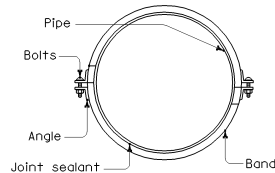
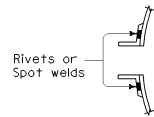
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**CONCRETE FLARED
END SECTIONS**

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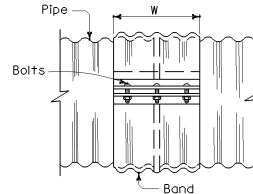
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D94B

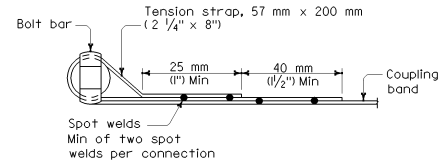
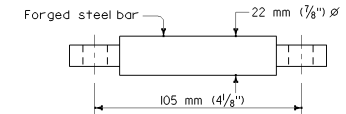
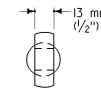
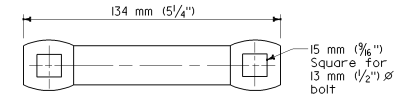
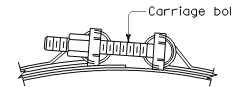
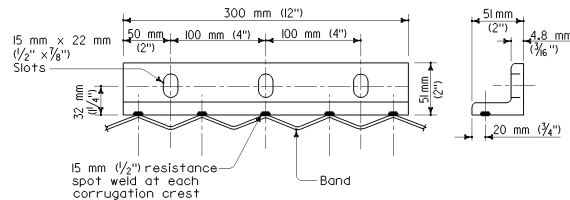
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END VIEW

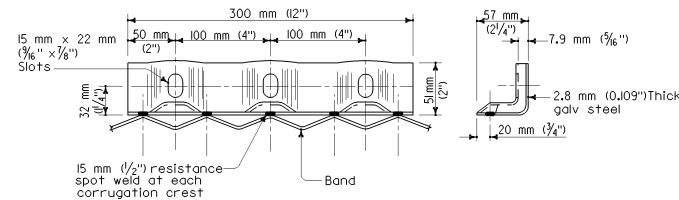
ANNULAR BAND

SIDE VIEW

STRAP DETAILTOP VIEWLEFT SIDE VIEWFRONT VIEWBOLT DETAILBAR DETAILBAR AND STRAP CONNECTORSIDE VIEWEND VIEW

51X 51X 4.8
(2 x 2 x 3/16) ANGLE

See tables on Standard Plans D97E, D97F and D97G for width, W=305 mm (12") shown

SIDE VIEWEND VIEW

DIE-FORMED ANGLE

See tables on Standard Plans D97E and D97G for width, W=305 mm (12") shown.

Alternate only for standard joints on pipes through 1800 mm (72") diameter and downdrains through 600 mm (24") diameter.

NOTES:

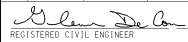
1. All ferrous metal coupling band connection hardware shall be galvanized or electropated in accordance with the Standard Specifications.
2. Dimensions and thicknesses shown are minimum.
3. Spot welds shall develop minimum required strength of strap.
4. Fillet welds of equivalent strength may be substituted for spot welds or rivets.

STATE OF CALIFORNIA
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**CORRUGATED METAL PIPE
 COUPLING DETAILS NO. 1
 ANNULAR COUPLING BAND BAR
 AND STRAP AND
 ANGLE CONNECTIONS**

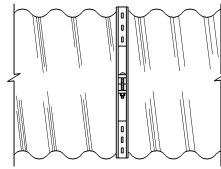
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NO SCALE

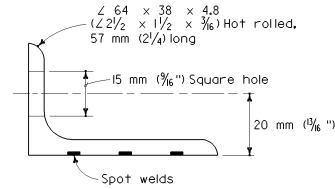
D97AANGLE CONNECTORS

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
 REGISTERED CIVIL ENGINEER					
July 1, 2002 PLANS APPROVAL DATE					
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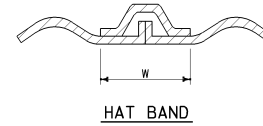
REGISTERED PROFESSIONAL ENGINEER
 Glenn DeCou
 No. C34541
 Exp. 9-30-03
 STATE OF CALIFORNIA



SIDE VIEW



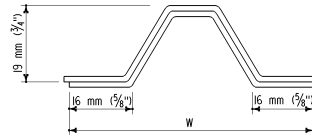
ANGLE



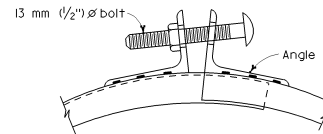
HAT BAND

NOTES:

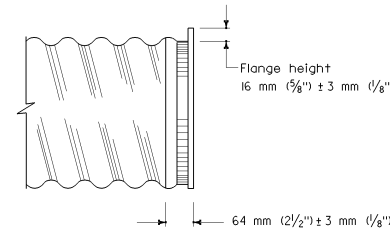
1. All ferrous metal coupling band connection hardware shall be galvanized or electroplated in accordance with the Standard Specifications.
2. Dimensions and thicknesses shown are minimum.
3. Spot welds shall develop minimum required strength of strap.
4. Fillet welds of equivalent strength may be substituted for spot welds or rivets.



SECTIONAL VIEW



BOLT DETAIL



SIDE VIEW

FLANGE DETAILS

Required for Hat band coupler

HAT BAND COUPLER

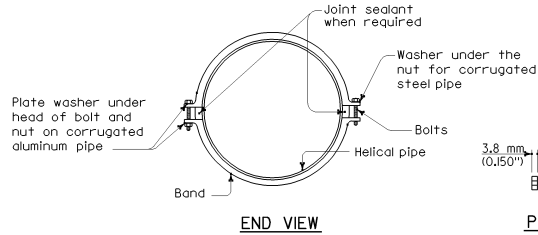
Angle connector shown

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**CORRUGATED METAL PIPE
COUPLING DETAILS NO. 2
HAT BAND COUPLER AND
FLANGE DETAILS**

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NO SCALE

D97B



TWO PIECE INTEGRAL FLANGE DIE FORMED BAND

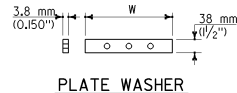
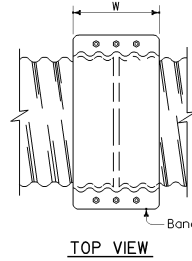
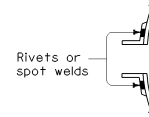


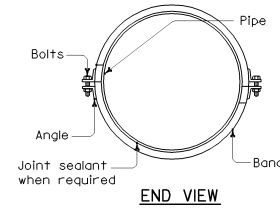
PLATE WASHER



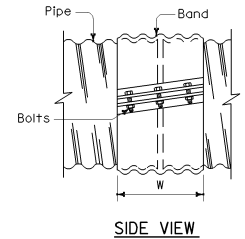
TOP VIEW



HELICAL COUPLING BANDS

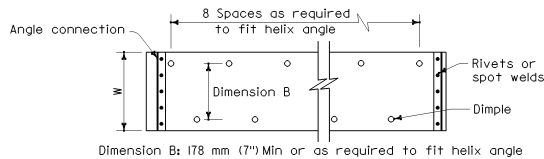


END VIEW



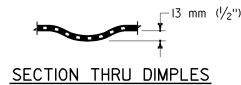
SIDE VIEW

HELICAL BAND

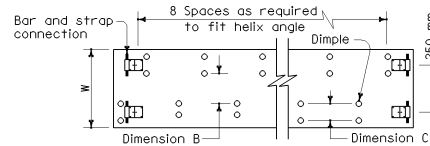


Dimension B: 178 mm (7") Min or as required to fit helix angle

PLAN

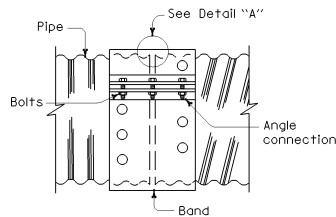


SECTION THRU DIMPLES

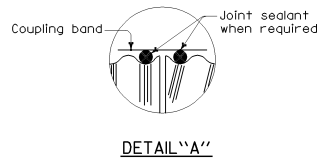


Dimension B: 178 mm (7") Min or as required to fit helix angle.
 Dimension C: 68 mm (2 2/3") Min or as required to fit helix angle.
 (Double dimple shown for use with 413 mm (16 1/4") bands)

PLAN

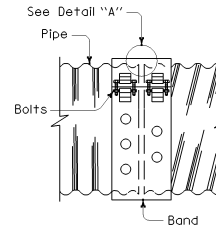


SIDE VIEW



DETAIL "A"

UNIVERSAL COUPLING BANDS



SIDE VIEW

NOTES:

1. All ferrous metal coupling band connection hardware shall be galvanized or electroplated in accordance with the Standard specifications.
2. Dimensions and thicknesses shown are minimum.
3. Spot welds shall develop minimum required strength of strap.
4. Fillet welds of equivalent strength may be substituted for spot welds or rivets.

STATE OF CALIFORNIA
 DEPARTMENT OF TRANSPORTATION
**CORRUGATED METAL PIPE
 COUPLING DETAILS NO. 3
 HELICAL AND UNIVERSAL
 COUPLERS**

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NO SCALE

D97C

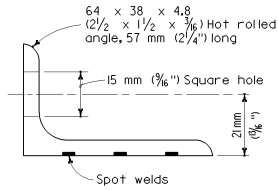
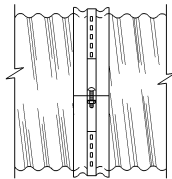
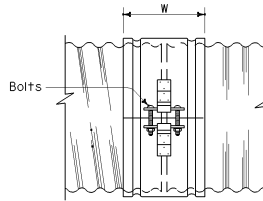
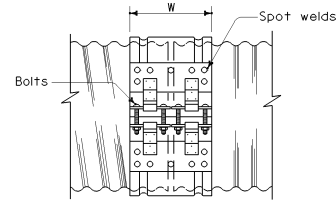
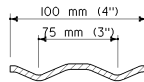
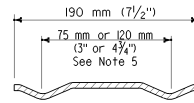
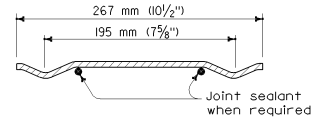
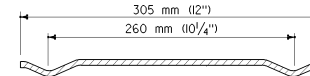
DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER
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 STATE OF CALIFORNIA

July 1, 2002
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ANGLESIDE VIEW
ANGLESIDE VIEW
SINGLE BAR AND STRAPSIDE VIEW
DOUBLE BAR AND STRAPSECTION
H-100 HUGGER BANDSECTION
H-190 HUGGER BANDSECTION
H-267 HUGGER BANDSECTION
H-305 HUGGER BANDHUGGER COUPLING BANDSSTATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION**CORRUGATED METAL PIPE
COUPLING DETAILS NO. 4
HUGGER COUPLING BANDS**

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D97D

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
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NOTES:

1. All ferrous metal coupling band connection hardware shall be galvanized or electroplated in accordance with the Standard Specifications.
2. Dimensions and thicknesses shown are minimum.
3. Spot welds shall develop minimum required strength of strap.
4. Fillet welds of equivalent strength may be substituted for spot welds or rivets.
5. Dimension depends upon whether end condition is lips up or lips down.

NOTES

- All ferrous metal coupling band connection hardware shall be galvanized or electroplated in accordance with the Standard Specifications.
- For helically corrugated coupling bands, the connection angles may be oriented parallel to the pipe axis, provided connecting holes are slotted lengthwise sufficiently to allow adjustment for the helix angle.
- Tension strap may be connected to band with either spot welds or fillet welds that develop minimum required strength of strap.
- Use 32 mm (1 1/4") gage line dimension on attached angle leg for rivets and spot welds.

- Band thickness shall not be less than:
 - 3 standard thicknesses lighter than the thickness of the pipe for Corrugated Steel Pipe.
 - 2 standard thicknesses lighter than the thickness of the pipe and in no case lighter than 1.5 mm (0.060") for Corrugated Aluminum Pipe.
- Dimensions, thicknesses and strengths shown are minimum.
- For pipe arches use same width band as for round pipe of equal periphery.
- Fillet welds of equivalent strength may be substituted for spot welds or rivets.
- Spot welds shall develop minimum required strength of strap.

- Pipe with rerolled ends having at least two 68 mm (2 2/3") x 13 mm (1/2") annular corrugations at each end with or without an upturned flange may be connected with any of the annular coupling bands shown for pipe of the same diameter and wall thickness and having 68 mm (2 2/3") x 13 mm (1/2") corrugations.
- In the case of H-305 (12") huggers/bands, two piece bands are required for diameters through 2400 mm (96") and three piece bands are required for diameters 2550 mm (102") through 3000 mm (120").
- Two piece bands are required for pipes greater than 1050 mm (42") diameter.

- The 57 mm x 51 mm x 2.8 mm (2 1/4" x 2" x 0.109") thick galvanized die-formed angle connector may be used in lieu of the 51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8") angle connector for standard joints only on pipes through 1800 mm (72") diameter.

COUPLING TYPE	PIPE CORRUGATION	PIPE SIZE	W OR A	PIPE WALL THICKNESS		BAND THICKNESS		BAR AND STRAP (CSP ONLY)				ANGLE							
				CSP	CAP	CSP	CAP	STRAP THICKNESS	BOLTS DIA	BAR DIA	BAR YIELD STRENGTH	DIMENSIONS		BOLTS		RIVETS ANGLE TO BAND		SPOT WELDS ANGLE TO BAND	
												CSP	CAP	CSP	CAP	CSP	CAP	CSP	CAP
TWO PIECE INTEGRAL FLANGE	38 mm x 6.5 mm (1 1/2" x 1/4")	150 mm - 250 mm (6" - 10")	178 mm (7")	1.32 mm - 2.01 mm (0.052" - 0.079")	1.22 mm - 1.52 mm (0.048" - 0.060")	1.32 mm (0.052")	1.52 mm (0.060")							2-10 mm (3/8")	2-10 mm (3/8")				
		300 mm - 450 mm (12" - 18")	178 mm (7")	1.32 mm - 2.01 mm (0.052" - 0.079")		1.63 mm (0.064")								2-13 mm (1/2")					
		68 mm x 13 mm (2 2/3" x 1/2")	300 mm (12" - 24")	1.32 mm - 2.01 mm (0.052" - 0.079")	1.52 mm - 2.67 mm (0.060" - 0.105")	1.63 mm (0.064")	1.52 mm (0.060")							2-13 mm (1/2")	2-13 mm (1/2")				
UNIVERSAL	68 mm x 13 mm (2 2/3" x 1/2")	THROUGH 900 mm (36")	305 mm (12")	1.32 mm - 3.51 mm (0.052" - 0.138")	1.52 mm - 3.43 mm (0.060" - 0.135")	1.32 mm (0.052")	1.52 mm (0.060")					51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")	51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")	3-13 mm (1/2")	3-13 mm (1/2")	3-9.5 mm (3/8")	3-9.5 mm (3/8")	3-15 mm (1/2")	
		1050 mm - 1500 mm (42" - 60")	305 mm (12")	1.32 mm - 4.27 mm (0.052" - 0.168")	1.91 mm - 4.17 mm (0.075" - 0.164")	1.32 mm (0.052")	1.52 mm (0.060")					51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")	51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")	3-13 mm (1/2")	3-13 mm (1/2")	3-9.5 mm (3/8")	3-9.5 mm (3/8")	5-15 mm (1/2")	
		THROUGH 1800 mm (72")	305 mm (12")	1.32 mm - 4.27 mm (0.052" - 0.168")	4.17 mm (0.164")	1.32 mm (0.052")	2.67 mm (0.105")	2.01 mm (0.079")	13 mm (1/2")	22 mm (7/8")	220 MPa (32 ksi)	51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")	51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")	3-13 mm (1/2")	3-13 mm (1/2")	3-9.5 mm (3/8")	3-9.5 mm (3/8")	5-15 mm (1/2")	
		1950 mm - 2100 mm (78" - 84")	413 mm (16 1/4")	4.27 mm (0.168")		2.01 mm (0.079")		DOUBLE 2.01 mm (0.079")	13 mm (1/2")	22 mm (7/8")	220 MPa (32 ksi)								
		THROUGH 900 mm (36")	178 mm (7")	1.63 mm - 3.51 mm (0.064" - 0.138")	1.52 mm - 3.43 mm (0.060" - 0.135")	1.32 mm (0.052")	1.52 mm (0.060")	2.01 mm (0.079")	13 mm (1/2")	22 mm (7/8")	220 MPa (32 ksi)	51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")	51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")	2-13 mm (1/2")	2-13 mm (1/2")	3-9.5 mm (3/8")	3-9.5 mm (3/8")	3-15 mm (1/2")	
ANNULAR	68 mm x 13 mm (2 2/3" x 1/2")	1050 mm - 1800 mm (42" - 72")	305 mm (12")	1.63 mm - 4.27 mm (0.064" - 0.168")	1.91 mm - 4.17 mm (0.075" - 0.164")	1.32 mm (0.052")	2.67 mm (0.105")	2.01 mm (0.079")	13 mm (1/2")	22 mm (7/8")	220 MPa (32 ksi)	51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")	51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")	3-13 mm (1/2")	3-13 mm (1/2")	3-9.5 mm (3/8")	3-9.5 mm (3/8")	5-15 mm (1/2")	
		1950 mm - 2100 mm (78" - 84")	305 mm (12")	4.27 mm (0.168")		2.01 mm (0.079")		2.77 mm (0.109")	13 mm (1/2")	22 mm (7/8")	310 MPa (45 ksi)	51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")		3-13 mm (1/2")		3-9.5 mm (3/8")		5-15 mm (1/2")	
		1200 mm - 2250 mm (48" - 90")	355 mm (14")	1.63 mm - 2.77 mm (0.064" - 0.109")		1.32 mm (0.052")		2.01 mm (0.079")	13 mm (1/2")	22 mm (7/8")	220 MPa (32 ksi)	51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")		3-13 mm (1/2")		3-9.5 mm (3/8")		5-15 mm (1/2")	
		2400 mm - 3000 mm (96" - 120")	355 mm (14")	2.01 mm - 2.77 mm (0.079" - 0.109")		1.32 mm (0.052")		2.77 mm (0.109")	13 mm (1/2")	22 mm (7/8")	310 MPa (45 ksi)	51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")		3-13 mm (1/2")		4-9.5 mm (3/8")			
		1050 mm - 2100 mm (42" - 84")	355 mm (14")		1.52 mm - 3.43 mm (0.060" - 0.135")		1.52 mm (0.060")						51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")		3-13 mm (1/2")		3-9.5 mm (3/8")		
HELICAL	68 mm x 13 mm (2 2/3" x 1/2")	THROUGH 900 mm (36")	305 mm (12")	1.32 mm - 3.51 mm (0.052" - 0.138")	1.52 mm - 3.43 mm (0.060" - 0.135")	1.32 mm (0.052")	1.52 mm (0.060")	2.01 mm (0.079")	13 mm (1/2")	22 mm (7/8")	220 MPa (32 ksi)	51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")	51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")	3-13 mm (1/2")	3-13 mm (1/2")	3-9.5 mm (3/8")	3-9.5 mm (3/8")	3-15 mm (1/2")	
		1050 mm - 1800 mm (42" - 72")	305 mm (12")	1.32 mm - 4.27 mm (0.052" - 0.168")	1.91 mm - 4.17 mm (0.075" - 0.164")	1.32 mm (0.052")	1.52 mm (0.060")	2.01 mm (0.079")	13 mm (1/2")	22 mm (7/8")	220 MPa (32 ksi)	51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")	51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")	3-13 mm (1/2")	3-13 mm (1/2")	3-9.5 mm (3/8")	3-9.5 mm (3/8")	5-15 mm (1/2")	
		1950 mm - 2100 mm (78" - 84")	305 mm (12")	4.27 mm (0.168")		2.01 mm (0.079")		2.77 mm (0.109")	13 mm (1/2")	22 mm (7/8")	310 MPa (45 ksi)	51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")		3-13 mm (1/2")		3-9.5 mm (3/8")		5-15 mm (1/2")	
		1200 mm - 2250 mm (48" - 90")	355 mm (14")	1.63 mm - 2.77 mm (0.064" - 0.109")		1.32 mm (0.052")		2.01 mm (0.079")	13 mm (1/2")	22 mm (7/8")	220 MPa (32 ksi)	51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")		3-13 mm (1/2")		3-9.5 mm (3/8")		5-15 mm (1/2")	
		2400 mm - 3000 mm (96" - 120")	355 mm (14")	2.01 mm - 2.77 mm (0.079" - 0.109")		1.32 mm (0.052")		2.77 mm (0.109")	13 mm (1/2")	22 mm (7/8")	310 MPa (45 ksi)	51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")		3-13 mm (1/2")		4-9.5 mm (3/8")			
	75 mm x 25 mm (3" x 1")	1050 mm - 2100 mm (42" - 84")	355 mm (14")		1.52 mm - 3.43 mm (0.060" - 0.135")		1.52 mm (0.060")						51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")		3-13 mm (1/2")		3-9.5 mm (3/8")		


STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION CORRUGATED METAL PIPE COUPLING DETAILS NO. 5 STANDARD JOINT

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NO SCALE

D97E

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DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
 REGISTERED CIVIL ENGINEER No. C34541 Exp. 9-30-03 STATE OF CALIFORNIA					
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COUPLING TYPE	PIPE CORRUGATION	PIPE SIZE	W OR A	PIPE WALL THICKNESS		BAND THICKNESS		BAR AND STRAP (CSP ONLY)				ANGLE				
				CSP	CAP	CSP	CAP	STRAP THICKNESS	BOLTS DIA	BAR DIA	BAR YIELD STRENGTH	DIMENSIONS		BOLTS		SPOT WELDS ANGLE TO BAND
												CSP	CAP	CSP	CAP	
HUGGER	68 mm x 13 mm (2 2/3" x 1/2") REROLLED END	300 mm - 1350 mm (12" - 54")	100 mm (4")	1.32 mm - 2.77 mm (0.052" - 0.109")		1.32 mm (0.052")						64 mm x 38 mm x 4.8 mm (2 1/2" x 1 1/2" x 3/16")	64 mm x 38 mm x 4.8 mm (2 1/2" x 1 1/2" x 3/16")	I-13 mm (1/2")		3-15 mm (1/2")
		1500 mm - 1650 mm (60" - 66")	100 mm (4")	2.77 mm (0.109")		1.63 mm (0.064")						64 mm x 38 mm x 4.8 mm (2 1/2" x 1 1/2" x 3/16")	64 mm x 38 mm x 4.8 mm (2 1/2" x 1 1/2" x 3/16")	I-13 mm (1/2")		3-15 mm (1/2")
		900 mm - 1200 mm (36" - 48")	100 mm (4")	3.51 mm (0.138")		1.63 mm (0.064")						64 mm x 38 mm x 4.8 mm (2 1/2" x 1 1/2" x 3/16")	64 mm x 38 mm x 4.8 mm (2 1/2" x 1 1/2" x 3/16")	I-13 mm (1/2")		3-15 mm (1/2")
		THROUGH 1800 mm (72")	267 mm (10 1/2")	1.32 mm - 4.27 mm (0.052" - 0.168")		1.32 mm (0.052")		2.01 mm (0.079")	13 mm (1/2")	22 mm (7/8")	220 MPa (32 ksi)					
		1950 mm - 2000 mm (78" - 84")	267 mm (10 1/2")	4.27 mm (0.168")		2.01 mm (0.079")		2.77 mm (0.109")	13 mm (1/2")	22 mm (7/8")	310 MPa (45 ksi)					
		1200 mm - 2250 mm (48" - 90")	267 mm (10 1/2")	1.63 mm - 2.77 mm (0.064" - 0.109")		1.32 mm (0.052")		2.01 mm (0.079")	13 mm (1/2")	22 mm (7/8")	220 MPa (32 ksi)					
	75 mm x 25 mm (3" x 1") REROLLED END	2400 mm - 3000 mm (96" - 120")	267 mm (10 1/2")	2.01 mm - 2.77 mm (0.079" - 0.109")		1.32 mm (0.052")		2.77 mm (0.109")	13 mm (1/2")	22 mm (7/8")	310 MPa (45 ksi)					
		1200 mm - 1650 mm (48" - 66")	190 mm (7 1/2")	1.63 mm - 2.77 mm (0.064" - 0.109")		1.63 mm (0.064")		2.01 mm (0.079")	13 mm (1/2")	22 mm (7/8")	220 MPa (32 ksi)	64 mm x 38 mm x 4.8 mm (2 1/2" x 1 1/2" x 3/16")	64 mm x 38 mm x 4.8 mm (2 1/2" x 1 1/2" x 3/16")	I-13 mm (1/2")		3-15 mm (1/2")
		1800 mm - 2250 mm (72" - 90")	190 mm (7 1/2")	1.63 mm - 2.01 mm (0.064" - 0.079")		1.63 mm (0.064")		2.01 mm (0.079")	13 mm (1/2")	22 mm (7/8")	220 MPa (32 ksi)	64 mm x 38 mm x 4.8 mm (2 1/2" x 1 1/2" x 3/16")	64 mm x 38 mm x 4.8 mm (2 1/2" x 1 1/2" x 3/16")	I-13 mm (1/2")		3-15 mm (1/2")
		1200 mm - 2250 mm (48" - 90")	190 mm (7 1/2")	1.63 mm - 3.51 mm (0.064" - 0.138")		1.63 mm (0.064")		2.01 mm (0.079")	13 mm (1/2")	22 mm (7/8")	220 MPa (32 ksi)					
		1200 mm - 3000 mm (48" - 120")	305 mm (12")	1.63 mm - 2.77 mm (0.064" - 0.109")		1.63 mm (0.064")		2.01 mm (0.079")	13 mm (1/2")	22 mm (7/8")	220 MPa (32 ksi)					
		1200 mm - 2100 mm (48" - 84")	305 mm (12")	3.51 mm (0.138")		1.63 mm (0.064")		2.01 mm (0.079")	13 mm (1/2")	22 mm (7/8")	220 MPa (32 ksi)					
HAT BAND	68 mm x 13 mm (2 2/3" x 1/2") REROLLED END	2250 mm - 3000 mm (90" - 120")	305 mm (12")	3.51 mm (0.138")		1.63 mm (0.064")		DOUBLE 2.01 mm (0.079")	13 mm (1/2")	22 mm (7/8")	220 MPa (32 ksi)					
		300 mm - 1350 mm (12" - 54")	70 mm (2 3/4")	1.32 mm - 2.77 mm (0.052" - 0.109")		1.63 mm (0.064")						64 mm x 38 mm x 4.8 mm (2 1/2" x 1 1/2" x 3/16")		I-13 mm (1/2")		
		1500 mm - 1650 mm (60" - 66")	70 mm (2 3/4")	2.77 mm (0.109")		1.63 mm (0.064")						64 mm x 38 mm x 4.8 mm (2 1/2" x 1 1/2" x 3/16")	64 mm x 38 mm x 4.8 mm (2 1/2" x 1 1/2" x 3/16")	I-13 mm (1/2")		3-15 mm (1/2")
		THROUGH 1050 mm (42")	70 mm (2 3/4")	3.51 mm (0.138")		1.63 mm (0.064")						64 mm x 38 mm x 4.8 mm (2 1/2" x 1 1/2" x 3/16")	64 mm x 38 mm x 4.8 mm (2 1/2" x 1 1/2" x 3/16")	I-13 mm (1/2")		3-15 mm (1/2")
		THROUGH 1650 mm (66")	70 mm (2 3/4")	3.51 mm (0.138")		1.63 mm (0.064")		2.01 mm (0.079")	13 mm (1/2")	22 mm (7/8")	220 MPa (32 ksi)					
		THROUGH 1650 mm (66")	70 mm (2 3/4")	4.27 mm (0.168")		2.01 mm (0.079")		2.01 mm (0.079")	13 mm (1/2")	22 mm (7/8")	220 MPa (32 ksi)					
	75 mm x 25 mm (3" x 1") REROLLED END	1200 mm - 1800 mm (48" - 72")	70 mm (2 3/4")	1.63 mm - 2.01 mm (0.064" - 0.079")		1.63 mm (0.064")						64 mm x 38 mm x 4.8 mm (2 1/2" x 1 1/2" x 3/16")		I-13 mm (1/2")		3-15 mm (1/2")
		1950 mm - 2250 mm (78" - 90")	70 mm (2 3/4")	1.63 mm - 2.01 mm (0.064" - 0.079")		1.63 mm (0.064")						64 mm x 38 mm x 4.8 mm (2 1/2" x 1 1/2" x 3/16")		I-13 mm (1/2")		3-15 mm (1/2")
		1200 mm - 1850 mm (48" - 66")	70 mm (2 3/4")	2.77 mm (0.109")		1.63 mm (0.064")						64 mm x 38 mm x 4.8 mm (2 1/2" x 1 1/2" x 3/16")		I-13 mm (1/2")		3-15 mm (1/2")
		1800 mm - 2700 mm (72" - 108")	70 mm (2 3/4")	2.77 mm (0.109")		2.01 mm (0.079")		2.77 mm (0.109")	13 mm (1/2")	22 mm (7/8")	220 MPa (32 ksi)					

* See Note II on Standard Plan D97E.

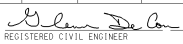
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**CORRUGATED METAL PIPE
COUPLING DETAILS NO. 5
STANDARD JOINT**

These "Standard Plans for Construction of Local Streets and Roads" contain units in two systems of measurement: International System of Units (SI or "metric") and United States Standard Measures shown in the parentheses (). The measurements expressed in the two systems are not necessarily equal or interchangeable. See the "Foreword" at the beginning of this publication.

NO SCALE

D97EA

COUPLING TYPE	PIPE CORRUGATION	PIPE SIZE	W OR A	PIPE WALL THICKNESS		BAND THICKNESS		BAR AND STRAP (ICSP ONLY)				ANGLE						
				CSP		CAP		STRAP THICKNESS	BOLTS	BAR DIA	BAR YIELD STRENGTH	DIMENSIONS		BOLTS		RIVETS ANGLE TO BAND		SPOT WELDS ANGLE TO BAND
				CSP	CAP	CSP	CAP					CSP	CAP	CSP	CAP	CSP	CAP	
TWO PIECE INTEGRAL FLANGE	38 mm x 6.5 mm (1 1/2" x 1/4")	150 mm-250 mm (6"-10")	178 mm (7")	L63 mm-2.01 mm (0.064"-0.079")	L52 mm (0.060")	L63 mm (0.064")	L52 mm (0.060")							2-10 mm (2-3/8")	2-10 mm (2-3/8")			
	68 mm x 13 mm (2 3/4" x 1/2")	300 mm-600 mm (12"-24")	305 mm (12")	L52 mm-2.67 mm (0.060"-0.105")	L52 mm (0.060")	L52 mm (0.060")	L52 mm (0.060")							3-13 mm (3-1/2")	3-13 mm (3-1/2")			
UNIVERSAL	68 mm x 13 mm (2 3/4" x 1/2")	THROUGH 900 mm (36")	305 mm (12")	L63 mm-3.51 mm (0.064"-0.138")	L52 mm-3.43 mm (0.060"-0.135")	L63 mm (0.064")	L52 mm (0.060")	2.01 mm (0.079")	13 mm (1/2")	22 mm (7/8")	220 MPa (32 ksi)	51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")	51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")	3-13 mm (3-1/2")	3-13 mm (3-1/2")	3-9.5 mm (3-3/8")	3-9.5 mm (3-3/8")	5-15 mm (5-1/2")
		1050 mm-1500 mm (42"-60")	413 mm (16 1/2")	L63 mm-4.27 mm (0.064"-0.168")	L52 mm-4.17 mm (0.060"-0.164")	L63 mm (0.064")	L52 mm (0.060")	DBL 2.01 mm (0.079")	13 mm (1/2")	22 mm (7/8")	220 MPa (32 ksi)	51 mm x 51 mm x 6.4 mm (2" x 2" x 1/4")	51 mm x 51 mm x 6.4 mm (2" x 2" x 1/4")	4-13 mm (4-1/2")	4-13 mm (4-1/2")	5-9.5 mm (5-3/8")	5-9.5 mm (5-3/8")	
ANNULAR	68 mm x 13 mm (2 3/4" x 1/2")	THROUGH 900 mm (36")	305 mm (12")	L63 mm-3.51 mm (0.064"-0.138")	L52 mm-3.43 mm (0.060"-0.135")	L63 mm (0.064")	L52 mm (0.060")					51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")	51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")	3-13 mm (3-1/2")	3-13 mm (3-1/2")	3-9.5 mm (3-3/8")	3-9.5 mm (3-3/8")	5-15 mm (5-1/2")
		1050 mm-1500 mm (42"-60")	305 mm (12")	L63 mm-2.01 mm (0.064"-0.079")		L63 mm (0.064")						51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")	51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")	3-13 mm (3-1/2")	3-13 mm (3-1/2")	3-9.5 mm (3-3/8")	3-9.5 mm (3-3/8")	5-15 mm (5-1/2")
		1050 mm-1500 mm (42"-60")	305 mm (12")	2.77 mm-4.27 mm (0.109"-0.168")	3.43 mm-4.17 mm (0.135"-0.164")	L63 mm (0.064")	L91 mm (0.075")					51 mm x 51 mm x 6.4 mm (2" x 2" x 1/4")	51 mm x 51 mm x 6.4 mm (2" x 2" x 1/4")	3-13 mm (3-1/2")	3-13 mm (3-1/2")	5-9.5 mm (5-3/8")	5-9.5 mm (5-3/8")	
		1650 mm-1800 mm (66"-72")	610 mm (24")		4.17 mm (0.164")		2.67 mm (0.105")											
		1650 mm-2100 mm (66"-84")	610 mm (24")	2.77 mm-4.27 mm (0.109"-0.168")		L63 mm (0.064")						51 mm x 51 mm x 6.4 mm (2" x 2" x 1/4")		5-13 mm (5-1/2")		7-9.5 mm (7-3/8")		
		1050 mm-1350 mm (42"-54")	305 mm (12")		L52 mm-2.67 mm (0.060"-0.105")	L52 mm (0.060")							51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")	3-13 mm (3-1/2")		3-9.5 mm (3-3/8")		
		1200 mm-1500 mm (48"-60")	355 mm (14")	L63 mm-2.01 mm (0.064"-0.079")		L63 mm (0.064")						51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")	3-13 mm (3-1/2")		3-9.5 mm (3-3/8")		5-15 mm (5-1/2")	
		1200 mm-1500 mm (48"-60")	355 mm (14")	2.77 mm (0.109")		L63 mm (0.064")						51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")	3-13 mm (3-1/2")		5-9.5 mm (5-3/8")			
		1650 mm-3000 mm (66"-120")	635 mm (25")	L63 mm-2.77 mm (0.064"-0.109")		L63 mm (0.064")						51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")	3-13 mm (3-1/2")		9-9.5 mm (9-3/8")			
	75 mm x 25 mm (3" x 1")	1050 mm-1500 mm (42"-60")	355 mm (14")		L52 mm-2.67 mm (0.060"-0.105")	L52 mm (0.060")							51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")	3-13 mm (3-1/2")		5-9.5 mm (5-3/8")		
		1050 mm-1500 mm (42"-60")	355 mm (14")		3.43 mm (0.135")	L91 mm (0.075")							51 mm x 51 mm x 6.4 mm (2" x 2" x 1/4")	3-13 mm (3-1/2")		5-9.5 mm (5-3/8")		
		1650 mm-2400 mm (66"-96")	635 mm (25")		L52 mm-3.43 mm (0.060"-0.135")	L52 mm (0.060")							51 mm x 51 mm x 6.4 mm (2" x 2" x 1/4")	3-13 mm (3-1/2")		7-9.5 mm (7-3/8")		
HELICAL	68 mm x 13 mm (2 3/4" x 1/2")	THROUGH 900 mm (36")	305 mm (12")	L63 mm-3.51 mm (0.064"-0.138")	L52 mm-3.43 mm (0.060"-0.135")	L63 mm (0.064")	L52 mm (0.060")					51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")	51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")	3-13 mm (3-1/2")	3-13 mm (3-1/2")	3-9.5 mm (3-3/8")	3-9.5 mm (3-3/8")	5-15 mm (5-1/2")
		1050 mm-1500 mm (42"-60")	305 mm (12")	L63 mm-2.01 mm (0.064"-0.079")		L63 mm (0.064")						51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")	3-13 mm (3-1/2")		3-9.5 mm (3-3/8")		5-15 mm (5-1/2")	
		1050 mm-1500 mm (42"-60")	305 mm (12")	2.77 mm-4.27 mm (0.109"-0.168")	3.43 mm-4.17 mm (0.135"-0.164")	L63 mm (0.064")	L91 mm (0.075")					51 mm x 51 mm x 6.4 mm (2" x 2" x 1/4")	51 mm x 51 mm x 6.4 mm (2" x 2" x 1/4")	3-13 mm (3-1/2")	3-13 mm (3-1/2")	5-9.5 mm (5-3/8")	5-9.5 mm (5-3/8")	
		1650 mm-2100 mm (66"-84")	610 mm (24")	2.77 mm-4.27 mm (0.109"-0.168")		L63 mm (0.064")						51 mm x 51 mm x 6.4 mm (2" x 2" x 1/4")	51 mm x 51 mm x 6.4 mm (2" x 2" x 1/4")	5-13 mm (5-1/2")		7-9.5 mm (7-3/8")		
		1650 mm-1800 mm (66"-72")	610 mm (24")		4.17 mm (0.164")		2.67 mm (0.105")											
		1650 mm-2100 mm (66"-84")	610 mm (24")	2.77 mm-4.27 mm (0.109"-0.168")		L63 mm (0.064")						51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")	51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")	3-13 mm (3-1/2")	3-13 mm (3-1/2")	3-9.5 mm (3-3/8")	3-9.5 mm (3-3/8")	5-15 mm (5-1/2")
		1200 mm-1500 mm (48"-60")	355 mm (14")	L63 mm-2.01 mm (0.064"-0.079")		L63 mm (0.064")						51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")	3-13 mm (3-1/2")		3-9.5 mm (3-3/8")		5-15 mm (5-1/2")	
		1200 mm-1500 mm (48"-60")	355 mm (14")	2.77 mm (0.109")		L63 mm (0.064")						51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")	3-13 mm (3-1/2")		5-9.5 mm (5-3/8")			
		1650 mm-3000 mm (66"-120")	635 mm (25")	L63 mm-2.77 mm (0.064"-0.109")		L63 mm (0.064")						51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")	3-13 mm (3-1/2")		9-9.5 mm (9-3/8")			
	75 mm x 25 mm (3" x 1")	1050 mm-1500 mm (42"-60")	355 mm (14")		L52 mm-2.67 mm (0.060"-0.105")	L52 mm (0.060")							51 mm x 51 mm x 4.8 mm (2" x 2" x 3/8")	3-13 mm (3-1/2")		5-9.5 mm (5-3/8")		
		1050 mm-1500 mm (42"-60")	355 mm (14")		3.43 mm (0.135")	L91 mm (0.075")							51 mm x 51 mm x 6.4 mm (2" x 2" x 1/4")	3-13 mm (3-1/2")		5-9.5 mm (5-3/8")		
		1650 mm-2400 mm (66"-96")	635 mm (25")		L52 mm-3.43 mm (0.060"-0.135")	L52 mm (0.060")							51 mm x 51 mm x 6.4 mm (2" x 2" x 1/4")	3-13 mm (3-1/2")		7-9.5 mm (7-3/8")		
		2400 mm-2700 mm (96"-108")	635 mm (25")		3.43 mm (0.135")	L91 mm (0.075")						51 mm x 51 mm x 6.4 mm (2" x 2" x 1/4")	3-13 mm (3-1/2")		7-9.5 mm (7-3/8")			

DIST	COUNTY	ROUTE	KILOMETER TOTAL PROJECT	POST NO.	SHEET NO.	TOTAL SHEETS
 REGISTERED CIVIL ENGINEER No. C24541 STATE OF CALIFORNIA						
July 1, 2002 PLANS APPROVAL DATE The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet. Caltrans now has a web site! To get to the web site, go to: http://www.dot.ca.gov						

NOTES:

- All ferrous metal coupling band connection hardware shall be galvanized or electroplated in accordance with the Standard Specifications.
- For helically corrugated coupling bands, the connection angles may be oriented parallel to the pipe axis, provided connecting holes are slotted lengthwise sufficiently to allow adjustment for the helix angle.
- Tension strap may be connected to band with either spot welds or fillet welds that develop minimum required strength of strap.
- Use 32 mm (1 1/4") gage line dimension on attached angle leg for rivets and spot welds.
- Band thickness shall not be less than:
 - 3 standard thicknesses lighter than the thickness of the pipe for corrugated steel pipe.
 - 2 standard thicknesses lighter than the thickness of the pipe and in no case lighter than 1.5 mm (0.060") for corrugated aluminum pipe.
- Dimensions, thicknesses and strengths shown are minimum.
- For pipe arches use same width band as for round pipe of equal periphery.
- Fillet welds of equivalent strength may be substituted for spot welds or rivets.
- Spot welds shall develop minimum required strength of strap.
- Pipe with rerolled ends having at least two 68 mm x 13 mm (2 3/4" x 1/2") annular corrugations at each end with or without an upturned flange may be connected with any of the annular coupling bands shown for pipe of the same diameter and wall thickness and having 68 mm x 13 mm (2 3/4" x 1/2") corrugations.
- In the case of H-305 (12") huggersbands, two piece bands are required for diameters through 2400 mm (96") and three piece bands are required for diameters 2550 mm (102") through 3000 mm (120").
- Two piece bands are required for pipes greater than 1050 mm (42") diameter.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CORRUGATED METAL PIPE COUPLING DETAILS NO. 6 POSITIVE JOINT

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NO SCALE

D97F

POSITIVE JOINTS



COUPLING TYPE	PIPE CORRUGATION	PIPE SIZE	W OR A	PIPE WALL THICKNESS		BAND THICKNESS		BAR AND STRAP (CSP ONLY)				ANGLE								
				CSP	CAP	CSP	CAP	STRAP THICKNESS	BOLTS	BAR DIA	BAR YIELD STRENGTH	DIMENSIONS		BOLTS		RIVETS ANGLE TO BAND		SPOT WELDS ANGLE TO BAND		
												CSP	CAP	CSP	CAP	CSP	CAP	CSP	CAP	CSP
HUGGER	68 mm x 13 mm (2 3/4" x 1/2")	THROUGH 1200 mm (48")	267 mm (10 1/2")	2.77 mm (0.109")		1.63 mm (0.064")		2.01 mm (0.079")	13 mm (1/2")	22 mm (7/8")	220 mm (32")									
		1350 mm-1650 mm (54"-66")	267 mm (10 1/2")	2.77 mm (0.109")		1.63 mm (0.064")		DBL 2.01 mm (0.079")	13 mm (1/2")	22 mm (7/8")	220 mm (32")									
		THROUGH 1350 mm (54")	267 mm (10 1/2")	1.63 mm-2.01 mm (0.064"-0.079")		1.63 mm (0.064")		2.01 mm (0.079")	13 mm (1/2")	22 mm (7/8")	220 mm (32")									
		THROUGH 1500 mm (60")	267 mm (10 1/2")	3.51 mm (0.138")		2.01 mm (0.079")		DBL 2.01 mm (0.079")	13 mm (1/2")	22 mm (7/8")	220 mm (32")									
		1650 mm-1800 mm (66"-72")	267 mm (10 1/2")	3.51 mm (0.138")		2.77 mm (0.109")		DBL 2.01 mm (0.079")	13 mm (1/2")	22 mm (7/8")	220 mm (32")									
	75 mm x 25 mm (3" x 1")	THROUGH 1800 mm (72")	267 mm (10 1/2")	4.27 mm (0.168")		2.77 mm (0.109")		DBL 2.01 mm (0.079")	13 mm (1/2")	22 mm (7/8")	310 mm (45")									
		1200 mm-2100 mm (48"-84")	267 mm (10 1/2")	2.77 mm (0.109")		2.01 mm (0.079")		DBL 2.01 mm (0.079")	13 mm (1/2")	22 mm (7/8")	220 mm (32")									
		1620 mm-2250 mm (64"-90")	267 mm (10 1/2")	1.63 mm-2.01 mm (0.064"-0.079")		1.63 mm (0.064")		DBL 2.01 mm (0.079")	13 mm (1/2")	22 mm (7/8")	220 mm (32")									
		2400 mm-2550 mm (96"-102")	267 mm (10 1/2")	2.01 mm (0.079")		2.01 mm (0.079")		DBL 2.01 mm (0.079")	13 mm (1/2")	22 mm (7/8")	220 mm (32")									
		2250 mm-3000 mm (90"-120")	267 mm (10 1/2")	2.77 mm (0.109")		2.77 mm (0.109")		DBL 2.01 mm (0.079")	13 mm (1/2")	22 mm (7/8")	310 mm (45")									
HAT BAND	68 mm x 13 mm (2 3/4" x 1/2")	300 mm-750 mm (12"-30")	70 mm (2 3/4")	1.63 mm-2.01 mm (0.064"-0.079")		1.63 mm (0.064")						64 mm x 38 mm x 4.8 mm (2 1/2" x 1 1/2" x 3/8")	1-13 mm (1- 1/2")					3-15 mm (3- 1/2")		
		900 mm-1200 mm (36"-48")	70 mm (2 3/4")	1.63 mm (0.064")		1.63 mm (0.064")						64 mm x 38 mm x 4.8 mm (2 1/2" x 1 1/2" x 3/8")	1-13 mm (1- 1/2")	3-12.7 mm (3- 1/2")			3-15 mm (3- 1/2")			
		900 mm-1200 mm (36"-48")	70 mm (2 3/4")	2.01 mm (0.079")		2.01 mm (0.079")		2.01 mm (0.079")	13 mm (1/2")	22 mm (7/8")	220 mm (32")									
		THROUGH 1050 mm (42")	70 mm (2 3/4")	2.77 mm (0.109")		2.01 mm (0.079")		2.01 mm (0.079")	13 mm (1/2")	22 mm (7/8")	220 mm (32")									

DOWNDRAIN

COUPLING TYPE	PIPE CORRUGATION	PIPE SIZE	W OR A	PIPE WALL THICKNESS				BAR AND STRAP (CSP ONLY)		ANGLE											
				PIPE WALL THICKNESS		BAND THICKNESS		STRAP THICKNESS	BOLTS	BAR DIA	DIMENSIONS				BOLTS		RIVETS		SPOT WELDS		
				CSP	CAP	CSP	CAP				CSP	CAP	CSP	CAP	CSP	CAP	CSP	CAP	CSP	CAP	
TWO PIECE INTEGRAL FLANGE	38 mm x 6.5 mm (1½" x ¼")	150 mm (6")	178 mm (7")	1.63 mm (0.064")		1.52 mm (0.060")											3-10 mm (3-¾")				
	38 mm x 6.5 mm (1½" x ¼")	200 mm-250 mm (8"-10")	178 mm (7")	1.63 mm (0.064")	1.52 mm (0.060")	1.63 mm (0.064")	1.52 mm (0.060")										3-10 mm (3-¾")	3-10 mm (3-¾")			
ANNULAR	68 mm x 13 mm (2¾" x ½")	THROUGH 600 mm (24")	305 mm (12")	1.63 mm (0.064")	1.52 mm (0.060")	1.63 mm (0.064")	1.52 mm (0.060")							51 mm x 51 mm x 4.8 mm (2" x 2" x ¾")	51 mm x 51 mm x 4.8 mm (2" x 2" x ¾")		3-13 mm (3-½")	3-13 mm (3-½")	3-9.5 mm (3-¾")	3-9.5 mm (3-¾")	3-15 mm (3-½")
	68 mm x 13 mm (2¾" x ½")	THROUGH 600 mm (24")	305 mm (12")	1.63 mm (0.064")	1.52 mm (0.060")	1.63 mm (0.064")	1.52 mm (0.060")							51 mm x 51 mm x 4.8 mm (2" x 2" x ¾")	51 mm x 51 mm x 4.8 mm (2" x 2" x ¾")		3-13 mm (3-½")	3-13 mm (3-½")	3-9.5 mm (3-¾")	3-9.5 mm (3-¾")	3-15 mm (3-½")
HUGGER	68 mm x 13 mm (2¾" x ½") REROLLED END	THROUGH 600 mm (24")	267 mm (10½")	1.63 mm (0.064")		1.63 mm (0.064")		2.01 mm (0.079")	13 mm (½")	22 mm (⅞")				51 mm x 51 mm x 4.8 mm (2" x 2" x ¾")	51 mm x 51 mm x 4.8 mm (2" x 2" x ¾")		3-13 mm (3-½")	3-13 mm (3-½")	3-9.5 mm (3-¾")	3-9.5 mm (3-¾")	3-15 mm (3-½")

NOTES:

- All ferrous metal coupling band connection hardware shall be galvanized or electroplated in accordance with the Standard Specifications.
- For helically corrugated coupling bands, the connection angles may be oriented parallel to the pipe axis, provided connecting holes are slotted lengthwise sufficiently to allow adjustment for the helix angle.
- Tension straps may be connected to band with either spot welds or fillet welds that develop minimum required strength of strap.
- Use 32 mm (1 1/4") gage line dimension on attached angle leg for rivets and spot welds.
- Band thickness shall not be less than:
 - 3 standard thickness lighter than the thickness of the pipe for corrugated steel pipe.
 - 2 standard thickness lighter than the thickness of the pipe and in no case lighter than 1.5 mm (0.060") for corrugated aluminum pipe.
- Dimensions, thickness and strengths shown are minimum.
- For pipe arches use same width band as for round pipe of equal periphery.
- Fillet welds of equivalent strength may be substituted for spot welds or rivets.
- Spot welds shall develop minimum required strength of strap.
- Pipe with rerolled ends having at least two 68 mm x 13 mm (2 3/4" x 1/2") annular corrugations at each end with or without an upturned flange may be connected with any of the annular coupling bands shown for pipe of the same diameter and wall thickness and having 68 mm x 13 mm (2 3/4" x 1/2") corrugations.
- Two piece bands are required for pipes greater than 1050 mm (42") diameter.
- For downdrain applications, two piece integral flange couplers shall have factory applied sleeve type rubber gaskets with a minimum length of 175 mm (7") measured along the length of the pipe.

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**CORRUGATED METAL PIPE
COUPLING DETAILS NO. 7
POSITIVE JOINTS AND
DOWNDRAINS**

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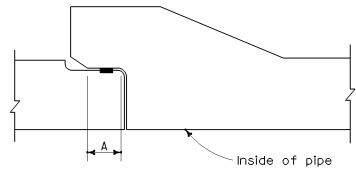
NO SCALE

D97G

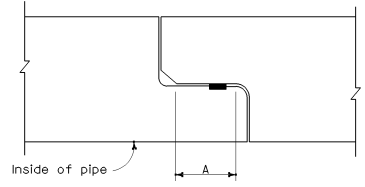
DIST.	COUNTY	ROUTE	KILOMETER TOTAL PROJECT	POST NO.	SHEET TOTAL SHEETS

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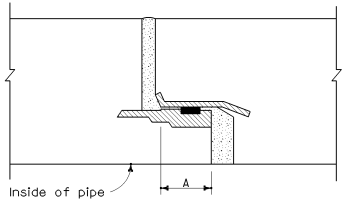
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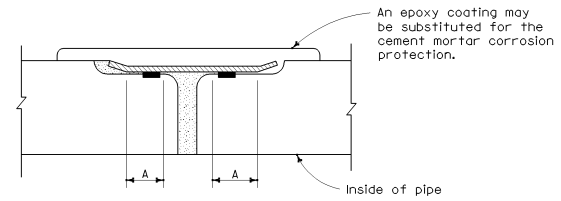
CONCRETE JOINT-FLARED BELL DESIGN



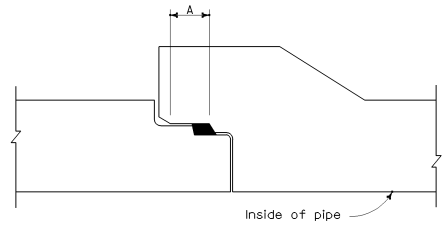
CONCRETE JOINT-FLUSH BELL DESIGN



STEEL JOINT-FLUSH BELL DESIGN

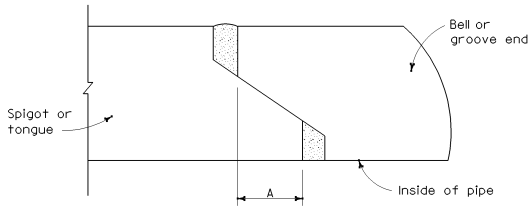


CONCRETE JOINT-DOUBLE GASKET DESIGN

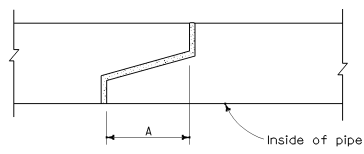


**CONCRETE JOINT-FLARED BELL DESIGN
(TYPE R-3)**

- LEGEND**
- Cement Mortar
 - Rubber Gasket
 - Steel



SELF-CENTERING TONGUE & GROOVE



TONGUE & GROOVE DESIGN

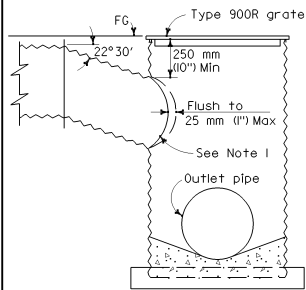
DIMENSION	STANDARD	POSITIVE	PIPE DIAMETER LIMITS
A	6 mm (1/4") Min	13 mm (1/2") Min	150 mm (6") through 300 mm (12") Dia
A	13 mm (1/2") Min	19 mm (3/4") Min	375 mm (15") through 825 mm (33") Dia
A	19 mm (3/4") Min	25 mm (1") Min	Greater than 825 mm (33") Dia

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**REINFORCED CONCRETE PIPE OR
 NON-REINFORCED CONCRETE PIPE
 STANDARD AND POSITIVE JOINTS**

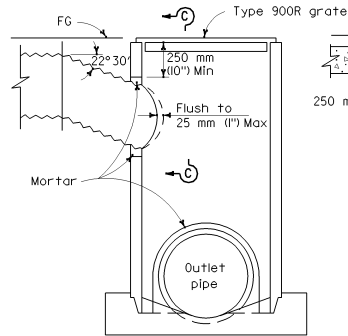
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NO SCALE

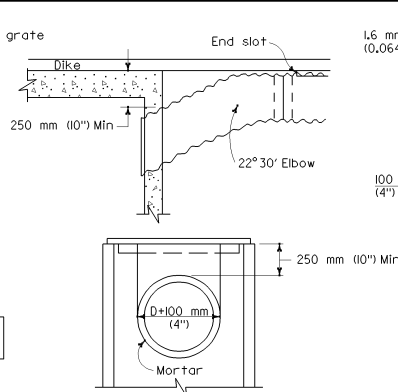
D97H

**TYPE GMP INLET**

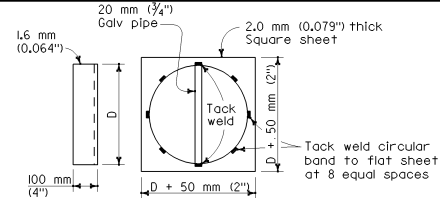
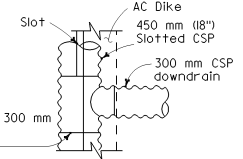
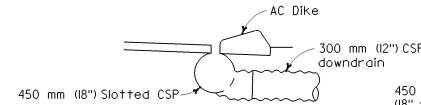
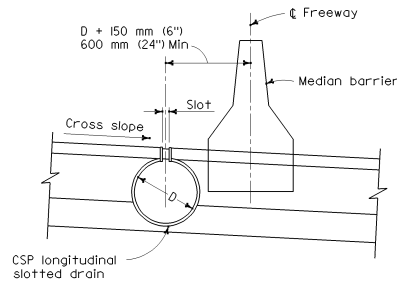
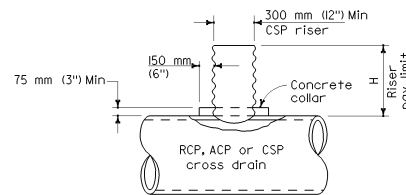
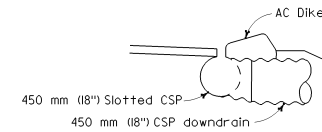
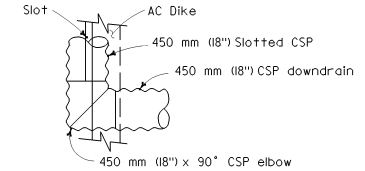
See Standard Plans D75 and D77B for additional inlet details

**TYPE GCP INLET**

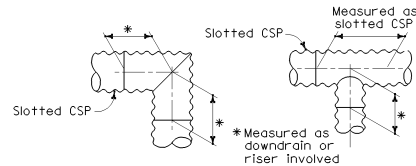
See Standard Plans D75 and D77B for additional inlet details

**SECTION C-C****METAL CAP DETAIL**

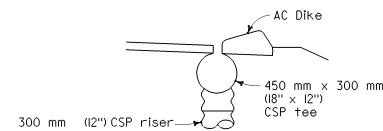
See Note 2

**ELEVATION****SHOULDER INSTALLATION 450 mm (18")****SLOTTED CSP TO 300 mm (12") CSP DOWNDRAIN****PLAN****TYPICAL CROSS SECTION****RISER CONNECTION DETAIL****ELEVATION****SHOULDER INSTALLATION 450 mm (18")****SLOTTED CSP TO 450 mm (18") CSP DOWNDRAIN****PLAN****NOTES:**

1. Either field joint sealed with a pliable mixture of sand, portland cement and emulsified asphalt (mixture of 1 part portland cement, 3-5 parts sand and 1/2 parts SSI emulsified asphalt), or continuous weld.
2. "D" equals nominal pipe diameter.
3. Length of elbows and tees is included in the linear feet of pipe involved shown on the Drainage List of the project plans.
4. Watertight joints required on all slotted CSP connections.

**MEASUREMENT OF CORRUGATED STEEL****PIPE ELBOWS AND TEES USED WITH SLOTTED DRAINS**

See Note 3

ELEVATION-END VIEW**SHOULDER INSTALLATION 450 mm (18")
SLOTTED CSP TO 300 mm (12") CSP RISER****ELEVATION-SIDE VIEW****SLOTTED CORRUGATED STEEL
PIPE DRAIN DETAILS**

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D98A

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SECTION B-B

ELEVATION

PART PLAN

HEEL GUARD
See Note 11

PARTIAL SECTION A-A

NOTE

As an alternate to swagged end an oversized bridge clip may be used.

PART PLAN

ELEVATION

BAR & STRAP CONNECTOR

See Standard Plan D97A

SIDE VIEW

PART PLAN

CHANNEL COUPLING BAND

RECTANGULAR SPACER

TAPERED SPACER

GRATE SLOT-SECTION

RECTANGULAR SPACER

TAPERED SPACER

GRATE SLOT-LONGITUDINAL ELEVATION VIEW

See Note 13

SLOTTED CORRUGATED STEEL PIPE

BACKFILL



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SLOTTED CORRUGATED STEEL PIPE DRAIN DETAILS

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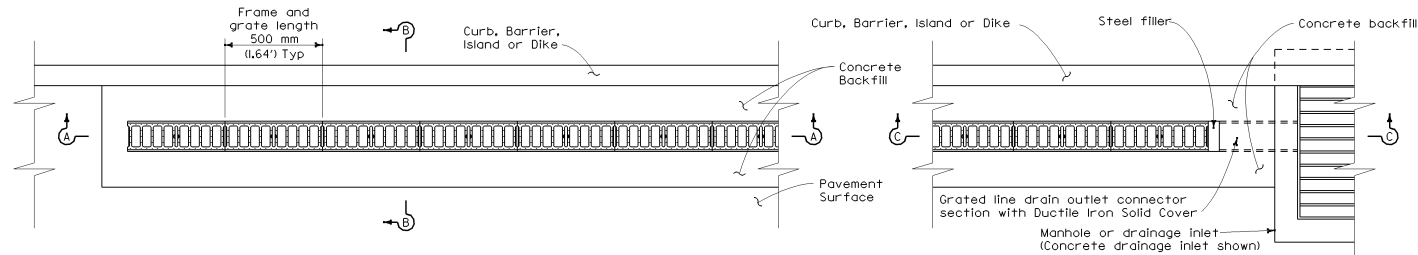
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D98B

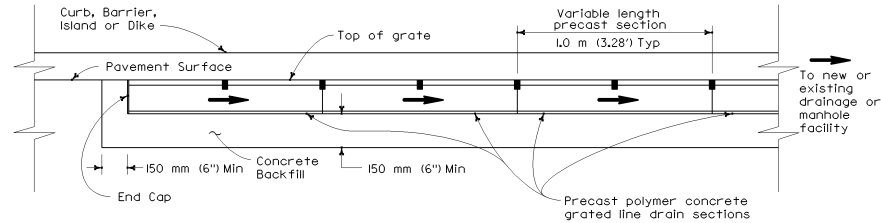
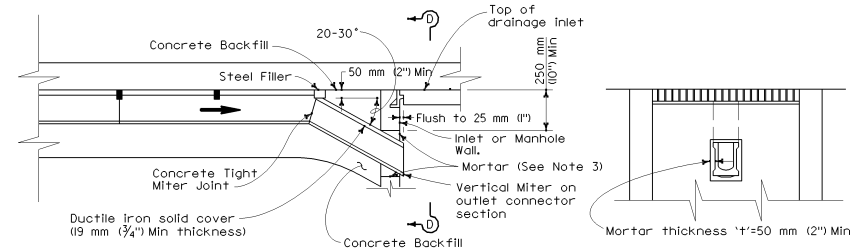
DIST.	COUNTY	ROUTE	KILOMETER	POST	SHEET	TOTAL
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NOTES

1. Drain pipe seams may be continuous helical lock seam or helical weld seam.
2. Drain sections shall be assembled with either of the coupling bands shown.
3. The cross bar spacer shall be welded to the bearing bars in such a manner as to develop a minimum tensile strength of 55,000 N (12,000 LBS) normal to the longitudinal axis of the bearing bars.
4. The maximum variance from a straight line between the extreme top corners of the bearing bars shall be 12 mm (1/2") in 6.0 m (20').
5. All coupling band connections shall be galvanized or coated in accordance with the Standard Specifications.
6. Spot welds shall develop minimum required strength of strap.
7. Dimensions shown are minimum.
8. Contractor to provide an adequate method of keeping the asphalt concrete out of pipe, during paving operations.
9. Minimum pipe wall thickness is 1.6 mm (0.064").
10. 600 mm (24") Diameter will not support normal highway wheel loads.
11. Use heel guard when specified.
12. Bottom edge of cross bar spacer offset in direction of flow.
13. Unless otherwise shown on the plans or specified in the special provisions, cross bar spacers shall be either rectangular or tapered at the contractor's option.



GRATED LINE DRAIN PLAN

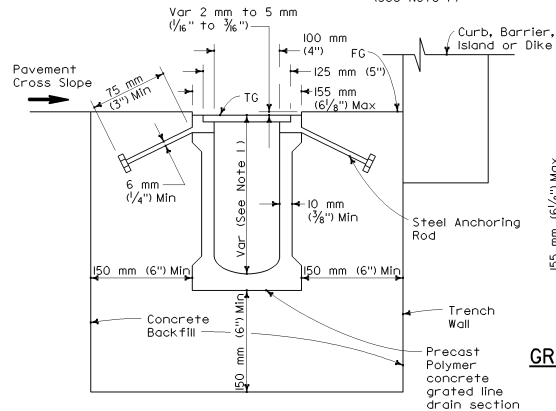
SECTION A-A
(See Note 1)

SECTION C-C

SECTION D-D

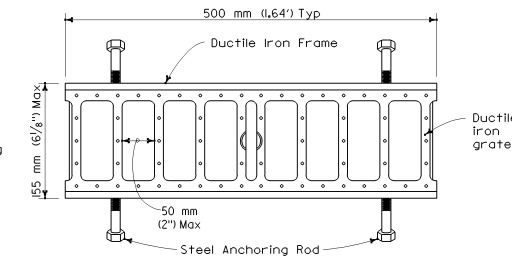
NOTES

1. Precast polymer concrete drain sections are available in non-sloped uniform depth sections 135 mm to 400 mm (5/4" to 15 3/4") or in 0.6 percent pre-sloped sections with graduated depths from 135 mm to 400 mm (5/4" to 15 3/4"). See Project Plans for trench sections to be installed.
2. Nominal dimensions shown. Allowable tolerance $\pm 2\%$.
3. For GMP inlet connection, field joint sealed with a pliable mixture of sand, portland cement and emulsified asphalt (mixture of 1 part portland cement, 3-5 parts sand and 1 1/2 part SSI emulsified asphalt).
4. Within designated pedestrian paths of travel, the maximum grate opening in the direction of pedestrian traffic shall be 12.7 mm (1/2").
5. Grate patterns may vary from detail shown. See Special Provisions for requirements.
6. Steel anchoring rods not used when frame is integral with polymer concrete grated line drain section.



SECTION B-B

(Precast grated line drain with non-integral frame)
See Note 6



GRATED LINE DRAIN FRAME AND GRATE DETAIL

See Notes 4, 5 and 6

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**GRATED LINE
DRAIN DETAILS**

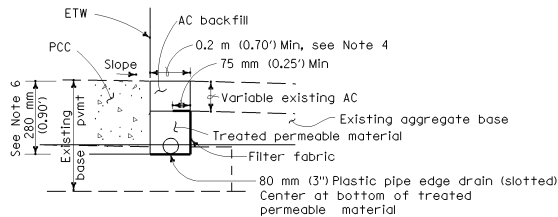
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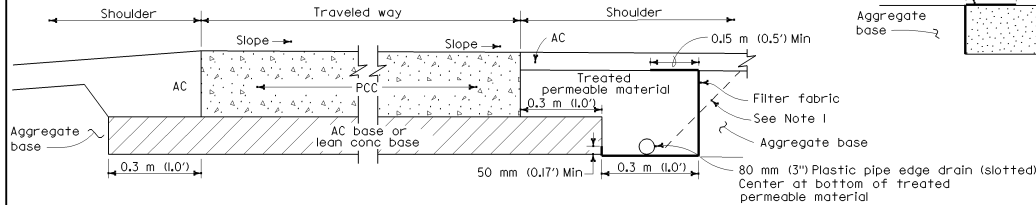
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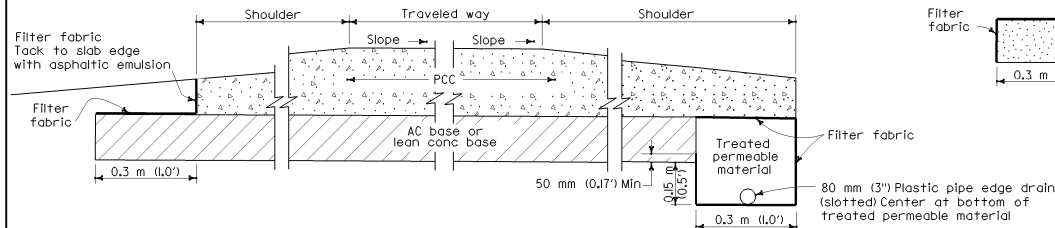
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 No. C52193
 Paul R. Davies
 July 12-31-02
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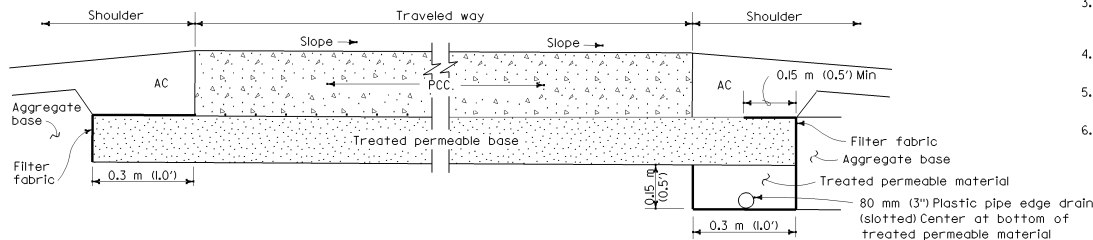
TYPE 1 STRUCTURAL SECTION DRAINAGE SYSTEM
(For existing highway facility)



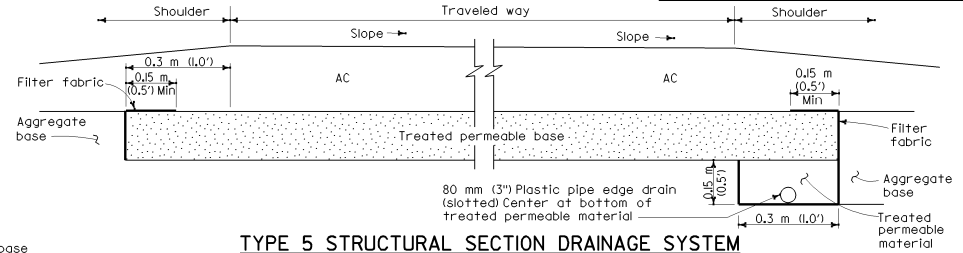
TYPE 2 STRUCTURAL SECTION DRAINAGE SYSTEM
(New construction)



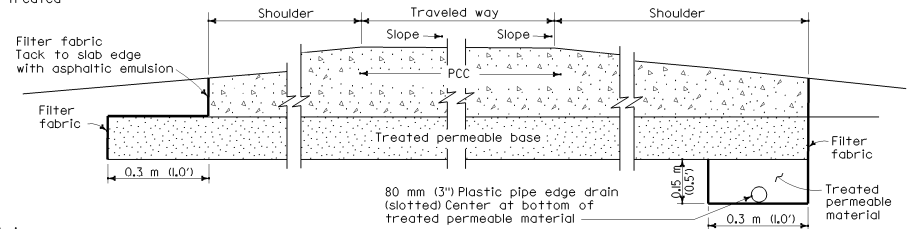
TYPE 3 STRUCTURAL SECTION DRAINAGE SYSTEM
(New construction)



TYPE 4 STRUCTURAL SECTION DRAINAGE SYSTEM
(New construction)



TYPE 5 STRUCTURAL SECTION DRAINAGE SYSTEM
(New construction)



TYPE 6 STRUCTURAL SECTION DRAINAGE SYSTEM
(New construction)

NOTES:

1. At the Contractor's option, on new construction, the vertical jointline (including the filter fabric) between the treated permeable material and the shoulder base/subgrade material may be rotated about its midpoint to a slope not flatter than 1:1 as shown by the dashed lines.
2. See the project plans and typical cross sections for pavement structural section details.
3. The plan layout for structural section drainage collector and outlet systems for new portland cement concrete pavement and new asphalt concrete pavement is the same as that shown on Standard Plan D99B.
4. For plastic pipe edge drain diameter larger than 80 mm (3"), the minimum trench width shall be equal to the outside diameter of the plastic pipe plus 100 mm (4").
5. For plastic pipe edge drain diameters larger than 80 mm (3"), all details for 80 mm (3") plastic pipe edge drain shall apply.
6. For pavements thicker than 230 mm (0.75'), the minimum trench depth is 0.3 m (1.0').

**STRUCTURAL SECTION
DRAINAGE SYSTEM DETAILS**

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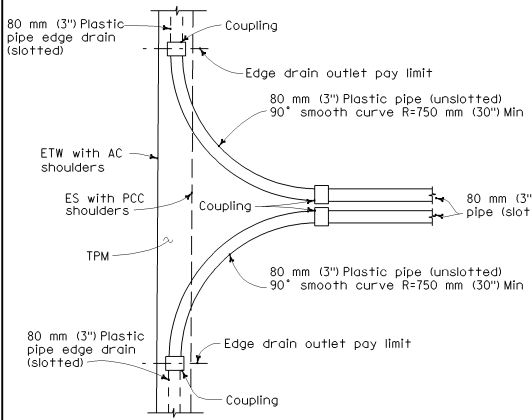
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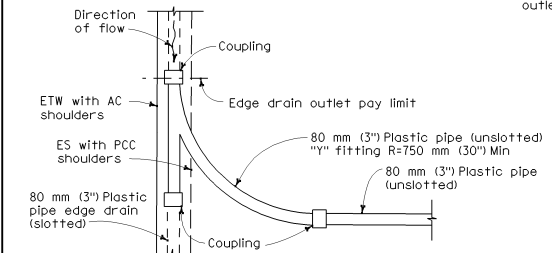
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NOTES:

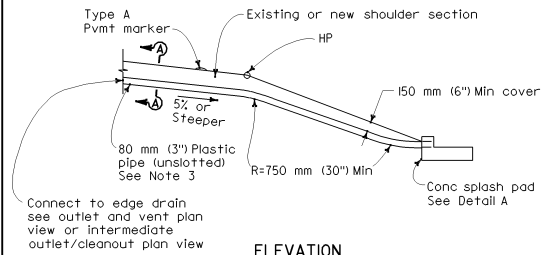
1. See project plans for location and type of outlet and/or vent installations.
2. The position of slotted plastic pipe and limits of treated permeable material shown are for the Type I structural section drainage system shown on Standard Plan D99A.
3. The maximum length of plastic pipe outlet shall be 15 m (50') measured from the longitudinal centerline of the collector trench to the pipe outlet. For pipe lengths greater than 15 m (50') use Type B outlets.
4. See project plans for slope protection details at Type C pipe outlets.
5. Backfill with aggregate base from outside edge paved shoulder to hinge point, and backfill with native material in slope area.
6. See Standard Plan D99C for Type G vent detail used with portland cement concrete shoulders.



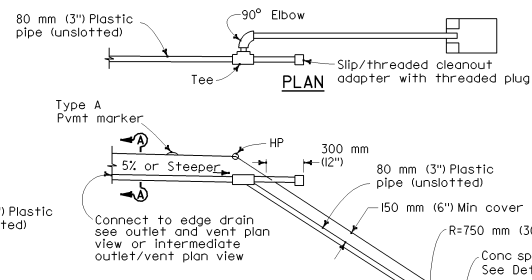
PLAN
DUAL OUTLET AND/OR VENT
See Note 2



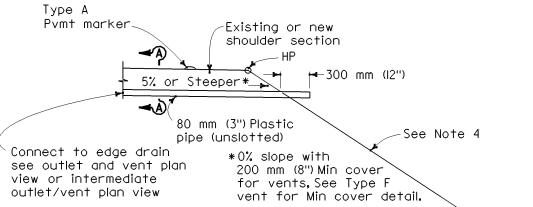
PLAN
INTERMEDIATE OUTLET
See Note 2



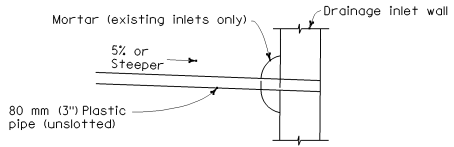
ELEVATION
TYPE A OUTLET



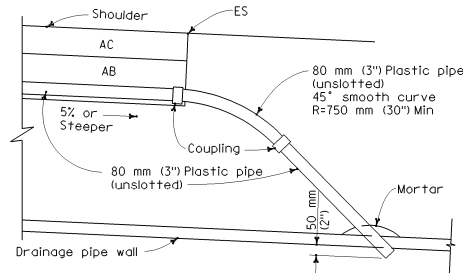
ELEVATION
TYPE B OUTLET



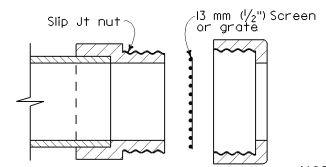
ELEVATION
TYPE C OUTLET AND/OR VENT



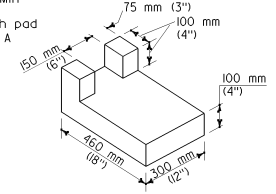
ELEVATION
TYPE D OUTLET CONNECTION TO DRAINAGE INLET



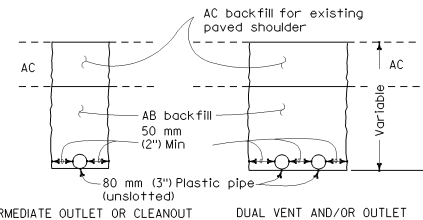
ELEVATION
TYPE E OUTLET CONNECTION TO DRAINAGE PIPE



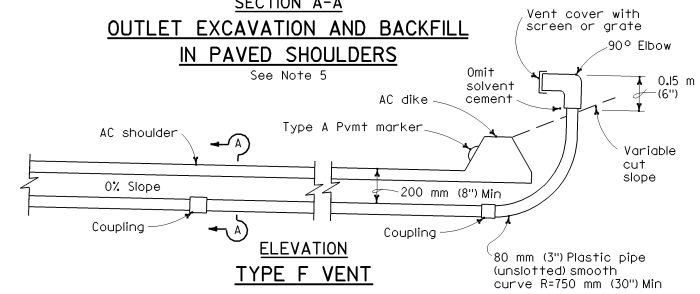
EDGE DRAIN OUTLET AND VENT COVER



DETAIL A
CONCRETE SPLASH PAD



SECTION A-A
OUTLET EXCAVATION AND BACKFILL IN PAVED SHOULDERS
See Note 5

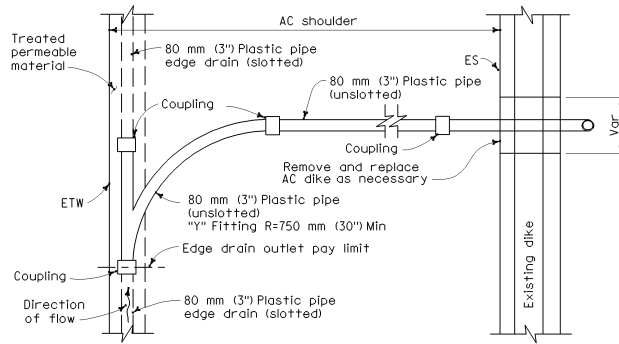


ELEVATION
TYPE F VENT
EDGE DRAIN OUTLET AND VENT DETAILS

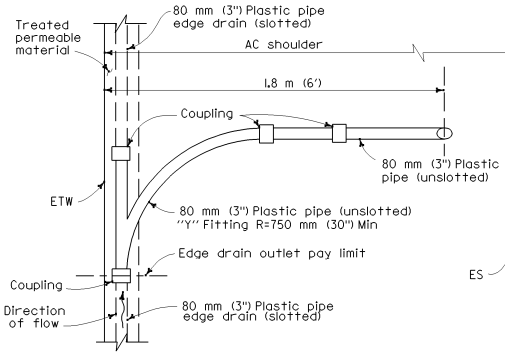
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NO SCALE

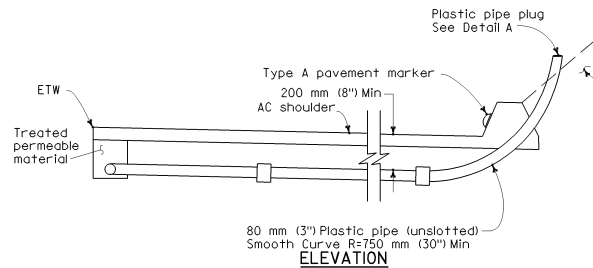
D99B



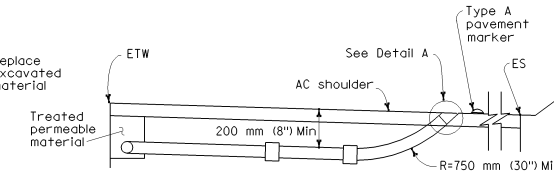
PLAN
TYPE 1 CLEANOUT
See Note 2



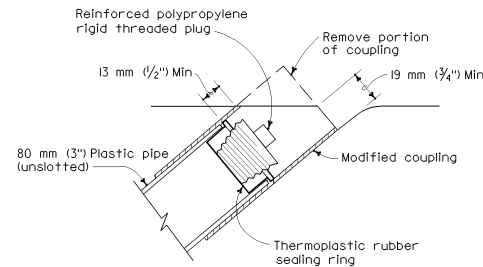
PLAN
TYPE 2 CLEANOUT
See Note 2



ELEVATION
TYPE 1 CLEANOUT

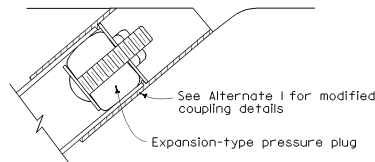


ELEVATION
TYPE 2 CLEANOUT

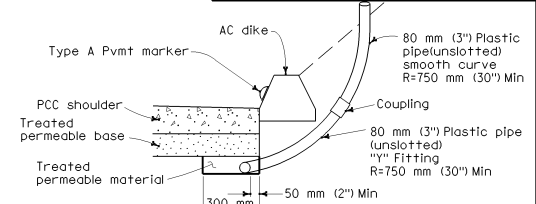


ALTERNATIVE 1

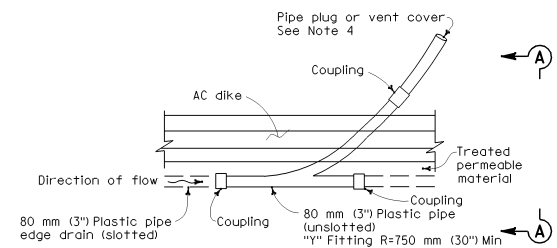
DETAIL A
PLASTIC PIPE PLUG
See Note 3



ALTERNATIVE 2



SECTION A-A
TYPE 3 CLEANOUT/TYPE G VENT



PLAN
TYPE 3 CLEANOUT/TYPE G VENT
See Note 4

NOTES:

1. See project plans for location and type of cleanout or vent installations.
2. The position of slotted plastic pipe and limits of treated permeable material shown are for the Type 1 structural section drainage system shown on Standard Plan D99A.
3. Other types of plugs may be substituted with the Engineer's approval.
4. The Type 3 cleanout and Type G vent is for use with portland cement concrete shoulders. The Type 6 structural section drainage system from Standard Plan D99A is shown. Use plastic pipe plug shown in Detail A with Type 3 cleanouts. Use vent cover shown on Standard Plan D99B with Type G vents.

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION **EDGE DRAIN CLEANOUT AND VENT DETAILS**

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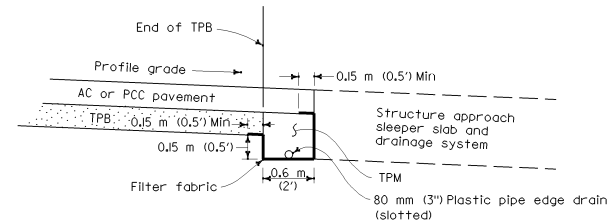
NO SCALE

D99C

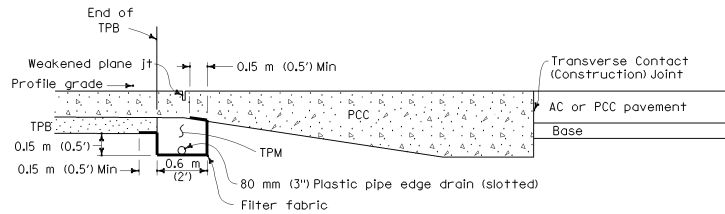
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July 1, 2002
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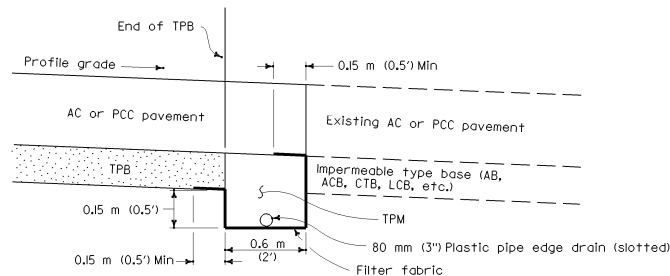
REGISTERED PROFESSIONAL ENGINEER
Kevin M. Merritt
No. C36577
Exp. 6-30-04
STATE OF CALIFORNIA



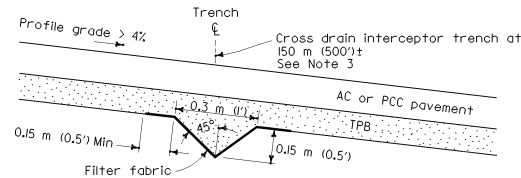
LONGITUDINAL SECTION
CROSS DRAIN INTERCEPTOR AT STRUCTURE APPROACH



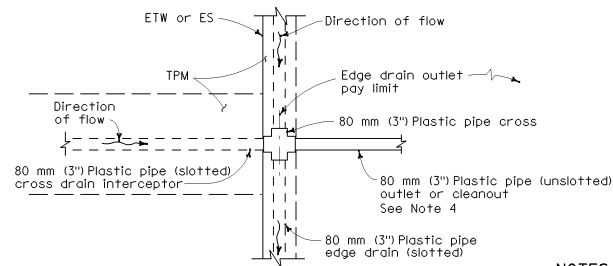
LONGITUDINAL SECTION
CROSS DRAIN INTERCEPTOR AT END ANCHOR
See Note 2



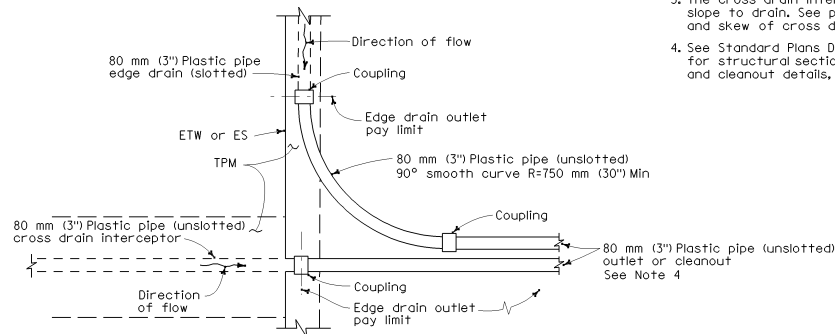
LONGITUDINAL SECTION
TERMINAL CROSS DRAIN INTERCEPTOR



LONGITUDINAL SECTION
INTERMEDIATE CROSS DRAIN INTERCEPTOR



PLAN
CROSS DRAIN INTERCEPTOR OUTLET
CONNECTION DETAILS



PLAN
COMBINED CROSS DRAIN
INTERCEPTOR/EDGE DRAIN
OUTLET DETAILS

NOTES:

1. Cross drain interceptors are for use with treated permeable bases.
2. See Standard Plan A35C for Pavement End Anchor details. A typical pavement end anchor is shown.
3. The cross drain interceptor trench shall slope to drain. See project plans for location and skew of cross drains.
4. See Standard Plans D99B and D99C, for structural section drainage system outlet and cleanout details, respectively.

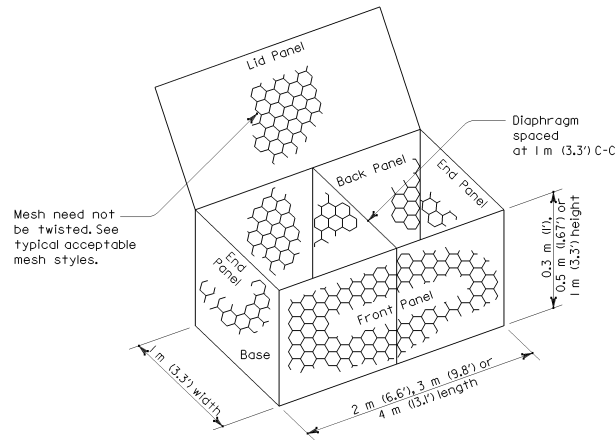
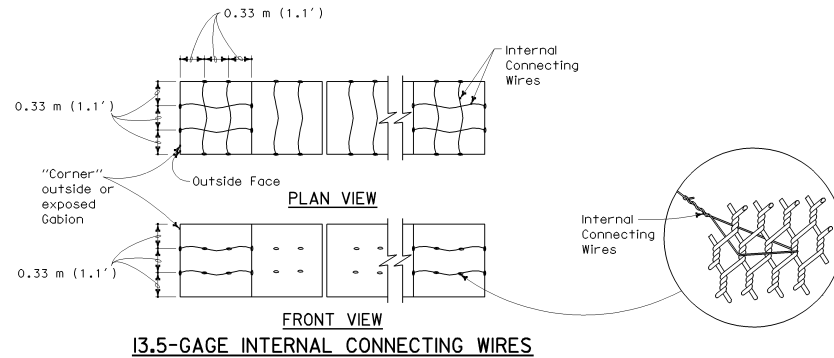
STATE OF CALIFORNIA
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CROSS DRAIN INTERCEPTOR
DETAILS

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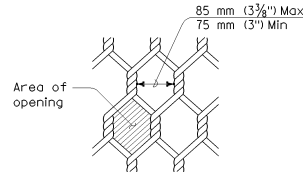
D99D

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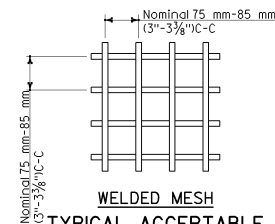


TYPICAL GABION BASKET

NOTE
Area of opening not to exceed 6650 mm² (10.3 in²).



TWISTED MESH



WELDED MESH

TYPICAL ACCEPTABLE MESH STYLES

STANDARD GABION SIZES					
LETTER CODE	LENGTH	WIDTH	HEIGHT	NUMBER OF DIAPHRAGMS	VOLUME
A	2 m (6.6')	1 m (3.3')	1 m (3.3')	1	2.0 m ³ (2.6 CY)
B	3 m (9.8')	1 m (3.3')	1 m (3.3')	2	3.0 m ³ (3.9 CY)
C	4 m (13.1')	1 m (3.3')	1 m (3.3')	3	4.0 m ³ (5.2 CY)
D	2 m (6.6')	1 m (3.3')	0.5 m (1.6')	1	1.0 m ³ (1.3 CY)
E	3 m (9.8')	1 m (3.3')	0.5 m (1.6')	2	1.5 m ³ (2.0 CY)
F	4 m (13.1')	1 m (3.3')	0.5 m (1.6')	3	2.0 m ³ (2.6 CY)
G	2 m (6.6')	1 m (3.3')	0.3 m (1')	1	0.6 m ³ (0.8 CY)
H	3 m (9.8')	1 m (3.3')	0.3 m (1')	2	0.9 m ³ (1.2 CY)
I	4 m (13.1')	1 m (3.3')	0.3 m (1')	3	1.2 m ³ (1.6 CY)

NOTES

- Internal connecting wire (13.5-gage) to be installed across width of interior gabions and across width and length of end gabions.
- Internal connecting wire and Gabion mesh shall be galvanized.
- Internal connecting wires required on all gabions 1 m (3.3') high.
- Preformed stiffeners (11-gage or 9-gage) are an acceptable alternative to internal connecting wires. Install them as recommended by manufacturer or as directed by the Engineer at 1/3 points.
- Place rock in end Gabion cell first, and continue by filling interior Gabion cells.
- For Gabion dimensions, refer to table "Standard Gabion Sizes".

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GABION BASKET DETAILS NO. 1

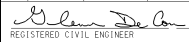

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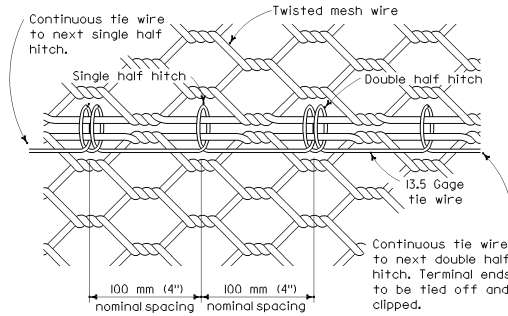
NO SCALE

D100A

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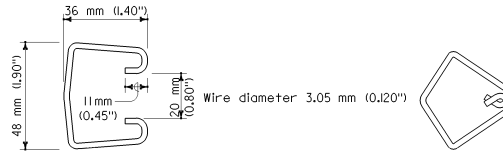
REGISTERED PROFESSIONAL ENGINEER
 Glenn DeCau
 No. C34541
 Exp. 9-30-03
 CIVIL
 STATE OF CALIFORNIA

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STANDARD TIE WIRE DETAIL

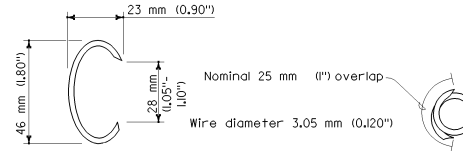
Alternating single and double half hitches (locked loops)
(See Note 2)



Before closure

After closure

INTERLOCKING FASTENER



Before closure

After closure

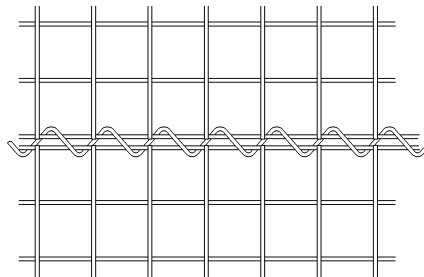
OVERLAPPING FASTENER

ALTERNATIVE GABION JOINT MATERIAL FASTENERS

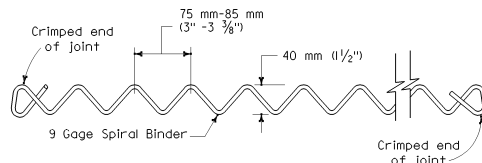
(Fastener dimensions nominal)
(See Notes 3 and 4)

NOTES

1. A joint connection must be made where any panel edge meets another panel. This includes adjacent gabion baskets, individual panels within a basket, diaphragm edges, etc.
2. Standard tie wire may be used as a joint connector for either twisted or welded mesh. Spiral binder is to be used with welded mesh only.
3. When alternative Gabion joint material fasteners are used, one fastener must be installed in each mesh opening, 10 fasteners minimum per meter (3.3'). Mesh openings are counted along one of the panels at the joint.
4. When alternative Gabion joint material fasteners are not capable of enclosing all wires along a joint, especially of Basket-To-Basket joints, either standard tie wire or spiral binder, as applicable, must be used.

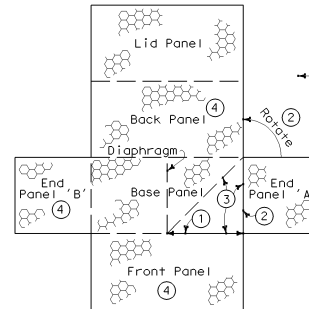


SPIRAL BINDER LACING



STANDARD SPIRAL BINDER

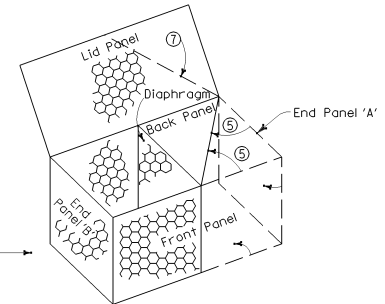
(See Note 2)



FLAT LAYOUT OF GABION BASKET

To Assemble Transitional Gabion Basket:

- Step 1 Cut mesh along joint between Front Panel and Base Panel.
- Step 2 Unfasten End Panel 'A' from Base Panel and rotate End Panel 'A' to Back Panel.
- Step 3 Fold the cut portion of the Base Panel into upright position along diagonal from the diaphragm to the corner of the Back Panel.
- Step 4 Fold the Back Panel, Front Panel and End Panel 'B' into upright positions. Fasten End Panel 'B' to the Back Panel and the Front Panel.
- Step 5 Rotate End Panel 'A' and the cut portion of the Front Panel inward against the upturned portion of the Base Panel. Fasten along the overlapped portion of the Front Panel and End Panel 'A'. Fasten the overlapped portion of the Front Panel and End Panel 'A' to the folded upright portion of the Base Panel along the diagonal (described in Step 3).
- Step 6 Fill the Transitional Gabion Basket with rock as per specifications.
- Step 7 Close lid and fold over corner of Lid Panel. Fasten along Lid Panel edges.



ASSEMBLED TRANSITIONAL GABION BASKET

TRANSITIONAL GABION BASKET

(For 2 m (6.6'), 3 m (9.8') or 4 m (13.1') gabion)

GABION BASKET DETAILS NO. 2

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NO SCALE

D100B

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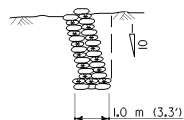
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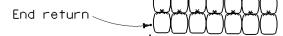
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Exp. 9-30-03
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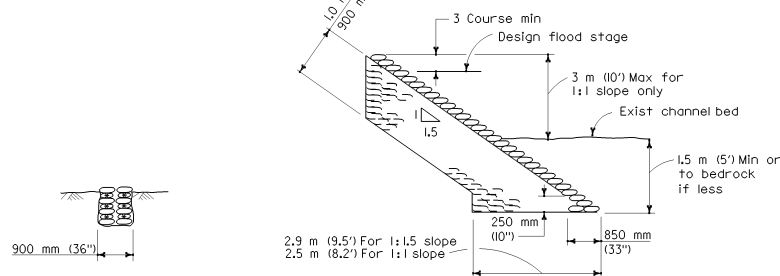


SECTION A-A

Scour cutoff stubs at 9 m (30') intervals.
Construct similar to end return.



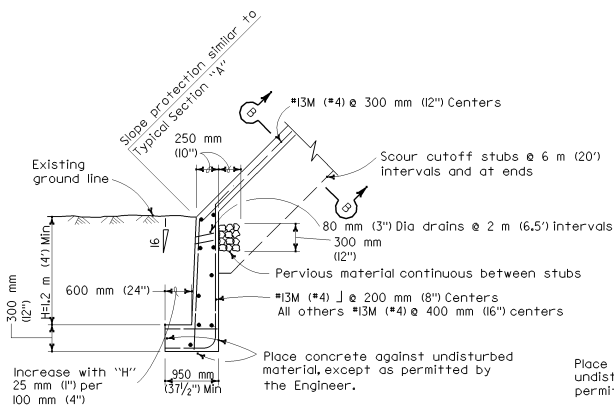
PLAN OF FIRST COURSE IN TRENCH



TYPICAL SECTION

SECTION OF SCOUR CUTOFF STUBS

SACKED CONCRETE SLOPE PROTECTION ON SLOPES 1:1.5 AND 1:1



TYPICAL SECTION "B"

CONCRETE SLOPE PROTECTION

Place concrete in toe against undisturbed material except as permitted by the Engineer.

Place concrete against undisturbed material, except as permitted by the Engineer.

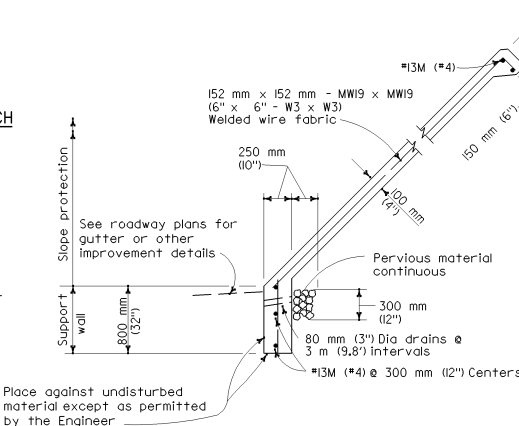
Place concrete against undisturbed material, except as permitted by the Engineer.

Place concrete against undisturbed material, except as permitted by the Engineer.

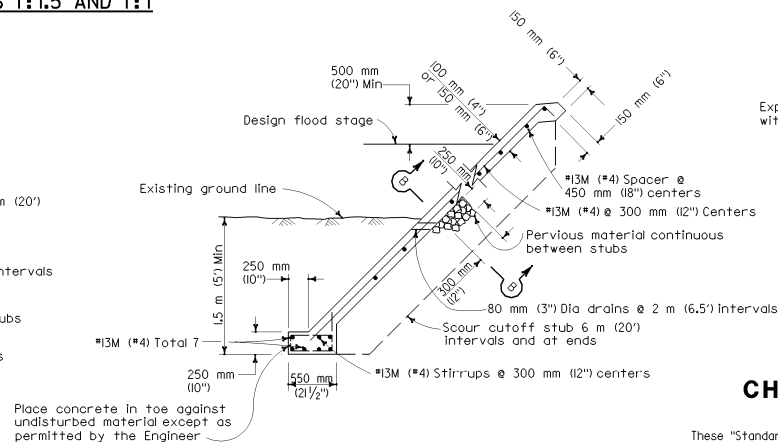
Place concrete against undisturbed material, except as permitted by the Engineer.

Place concrete against undisturbed material, except as permitted by the Engineer.

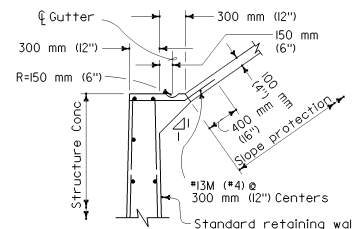
Place concrete against undisturbed material, except as permitted by the Engineer.



TYPICAL SECTION "C"



TYPICAL SECTION "A"



TYPICAL SECTION "D"

SECTION B-B

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION CHANNEL SLOPE PROTECTION DETAILS

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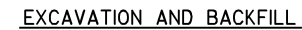
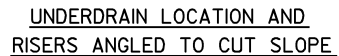
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D101



45° RISER



UNDERDRAIN RISERS



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D102

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A

AB aggregate base
 ABS acrylonitrile-butadiene-styrene
 AC asphalt concrete
 Adj adjacent/adjustable
 AIC auxiliary irrigation controller
 Alt alternative
 AMEND amendment
 ARV air release valve
 AUTO automatic
 AUX auxiliary
 AVB atmospheric vacuum breaker

B

B&B balled and burlapped
 B/B brass/bronze
 B/B/PL brass/bronze/plastic
 B/PL brass/plastic
 Bit Ctd bituminous coated
 BP booster pump
 BPA backflow preventer assembly
 BPAE backflow preventer assembly in enclosure
 BPE backflow preventer enclosure
 BV ball valve

C

CAP corrugated aluminum pipe
 CARV combination air release valve
 CCA cam coupler assembly
 CEC controller enclosure cabinet
 CHDPE corrugated high density polyethylene
 CL chain link
 CNC control and neutral conductors
 Conc concrete
 Cond conduit
 CSP corrugated steel pipe
 CST center strip
 CV check valve

D

Dia diameter
 DIP ductile iron pipe
 DN diameter nominal

E

EA each
 ELEC electric/electrical
 Elev elevation
 ENCL enclosure
 EP edge of pavement
 ES edge of shoulder
 EST end strip
 ESTB establishment
 ETW edge of traveled way

F

F full circle
 F/P full/part circle
 FAU filter assembly unit
 FCV flow control valve
 FERT fertilizer
 FG finished grade
 FIPT female iron pipe thread
 FIS fertilizer injector system
 FL flow line
 FM flow monitor
 FS flow sensor
 FV flush valve

G

Galv galvanized
 GARV garden valve
 GMP gallons per minute
 GSP galvanized steel pipe
 GV gate valve
 GPM Gallons Per Minute

H

H half circle, height
 h hour
 HB hose bib
 HDPE high density polyethylene
 HP horse power/hinge point
 HPL high pressure line
 Hwy highway

I

IC irrigation controller
 ICC irrigation controller(s)
 In controller enclosure cabinet
 ID inside diameter
 IFS irrigation filtration system
 In inches
 IPS iron pipe size
 IPT iron pipe thread
 Irr irrigation

L

lb pounds
 L/h liters per hour
 L/min liters per minute
 L/s liters per second

K

KP kilometer post

M

Max maximum
 MBGR metal beam guard railing
 MCV manual control valve
 MIC master irrigation controller
 Min minimum
 MIPT male iron pipe thread
 Misc miscellaneous
 Mtl material
 MVP maintenance vehicle pullout

N

NL nozzle line
 No. number
 NPT national pipe thread

O

O/C on center
 OD outside diameter
 oz ounce

P

P part circle
 PB pull box
 PCC portland cement concrete
 PE polyethylene
 PL plastic
 PLT plant/planting
 PLT ESTB plant establishment
 PR pressure rated
 PRLV pressure relief valve
 PRV pressure reducing valve
 PSI pounds per square inch
 PVC polyvinyl chloride
 Pvmnt pavement

Q

Q quarter circle
 QCV quick coupling valve

NOTE

FOR ADDITIONAL ABBREVIATIONS
 SEE STANDARD PLAN A10A.

R

R radius
 RCP reinforced concrete pipe
 RCV remote control valve
 RCVM remote control valve (master)
 RCW reclaimed water
 REQ required
 R/W right of way

S

S slip
 SCH schedule
 SF state-furnished
 Shld shoulder
 SI international system of units
 SQFT square foot
 SQYD square yards
 SST side strip
 STA station
 Std standard
 SW sidewalk/sound wall

T

T third circle/ thread
 TAB table(s)
 TLS truck loading standpipe
 TQ three quarter circle
 TRVD traveled
 TT two third circle
 Typ typical

U

UG underground

V

VAU valve assembly unit

W

W/ with
 WM water meter
 WS wye strainer
 WSP welded steel pipe
 WWM welded wire mesh

METRIC UNITS (SI)

SYMBOL	UNIT
mm	millimeter
m	meter
m ²	square meter
m ³	cubic meter
g	gram
kg	kilogram
s	second
KPa	kilopascal
L	liter
ha	hectare

PLANTING AND IRRIGATION ABBREVIATIONS

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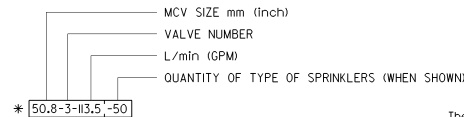
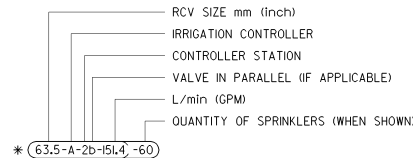
NO SCALE

H1

EXISTING	PROPOSED	ITEM DESCRIPTION
		WATER METER (BY OTHERS) (WM)
		BACKFLOW PREVENTER ASSEMBLY (BPA)
		BACKFLOW PREVENTER ASSEMBLY IN ENCLOSURE (BPAE)
		BACKFLOW PREVENTER ENCLOSURE (BPE)
		BOOSTER PUMP (BP)
		TRUCK LOADING STANDPIPE (TLS)
		FLOW SENSOR (FS)
		MASTER IRRIGATION CONTROLLER (MIC)
		AUXILIARY IRRIGATION CONTROLLER (AIC)
		IRRIGATION CONTROLLER (IC)/ IRRIGATION CONTROLLER (IC) (BATTERY)
		IRRIGATION CONTROLLER(S) IN CONTROLLER ENCLOSURE CABINET (ICC)
		CONTROL AND NEUTRAL CONDUCTORS (CNC)
		SPRINKLER CONTROL CONDUIT
		CONDUIT (COND)
		DUCTILE IRON PIPE (SUPPLY LINE) (MAIN) (DIP)
		GALVANIZED STEEL PIPE (SUPPLY LINE) (MAIN) (GSP)
		GALVANIZED STEEL PIPE (SUPPLY LINE) (LATERAL) (GSP)
		PLASTIC PIPE (PR 200) (SUPPLY LINE) (MAIN)
		PLASTIC PIPE (PR 200) (SUPPLY LINE) (LATERAL)
		PLASTIC PIPE (IRRIGATION LINE)
		REMOTE CONTROL VALVE (RCV) REMOTE CONTROL VALVE (MASTER) (RCVM)
		MANUAL CONTROL VALVE (MCV)
		VALVE ASSEMBLY UNIT (VAU)
		WYE STRAINER (WS)
		FILTER ASSEMBLY UNIT (FAU)
		GATE VALVE (GV)
		BALL VALVE (BV)

EXISTING	PROPOSED	ITEM DESCRIPTION
		QUICK COUPLING VALVE (OCV)
		PRESSURE REDUCING VALVE (PRV)
		PRESSURE RELIEF VALVE (PRLV)
		FLOW CONTROL VALVE (FCV)
		COMBINATION AIR RELEASE VALVE (CARV)
		CHECK VALVE (CV)
		FLUSH VALVE (FV)
		NOZZLE LINE W/TURNING UNION
		IRRIGATION SYSTEM
		IRRIGATION SYSTEM TO BE REMOVED
		CHAIN LINK GATE
		QUICK COUPLING VALVE W/SPRINKLER PROTECTOR
		SPRINKLER W/SPRINKLER PROTECTOR
		CONNECT TO EXISTING SYSTEM
		CAP
		CAP EXISTING

VALVE CODE



* VALVE CODES FOR EXISTING VALVES ARE SHOWN IN A DASHED ENCLOSURE.

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

Gregory A. Balzer
REGISTERED LANDSCAPE ARCHITECT
July 1, 2002
PLANS APPROVAL DATE
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Exp. 2-28-03
STATE OF CALIFORNIA

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**PLANTING AND IRRIGATION
SYMBOLS**

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NO SCALE

H2

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<p>July 1, 2002 PLANS APPROVAL DATE</p>					
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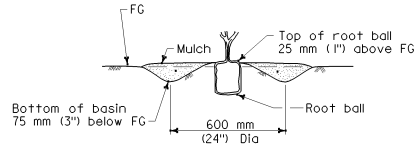
LANDSCAPE ARCHITECT

Gregory A. Balzer

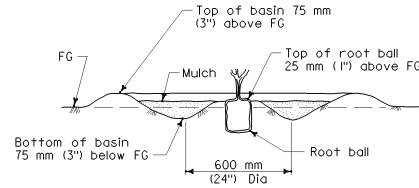
No. 2316

Exp. 2-28-03

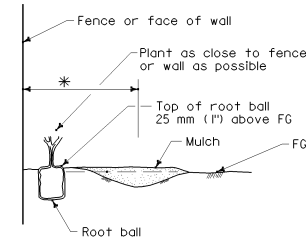
STATE OF CALIFORNIA



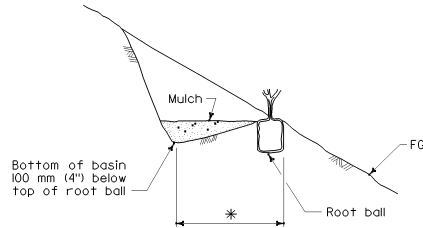
**SECTION
(FLAT AREA)**



**SECTION
(FLAT AREA)**

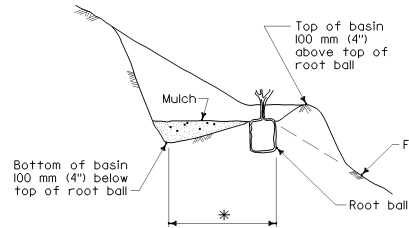


**SECTION
(FLAT AREA)**



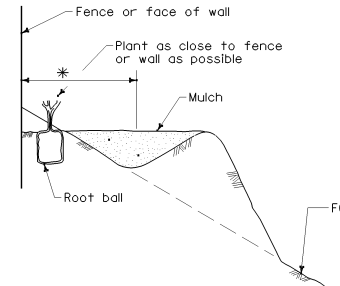
**SECTION
(SLOPE AREA)**

BASIN TYPE I



**SECTION
(SLOPE AREA)**

BASIN TYPE II



**SECTION
(SLOPE AREA)**

BASIN TYPE III

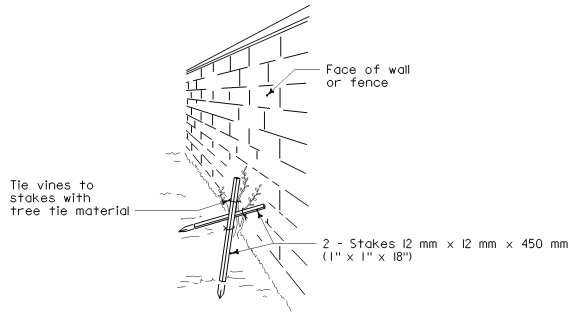
* Basin area equivalent to 600 mm (24") Dia

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**PLANTING AND IRRIGATION
DETAILS**

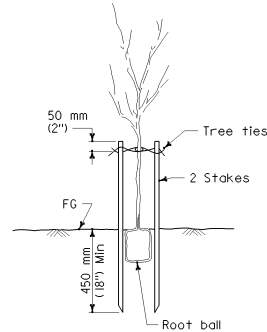
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NO SCALE

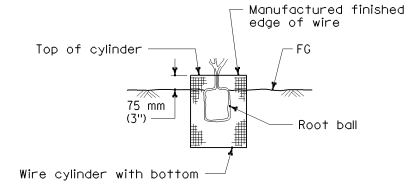
H3



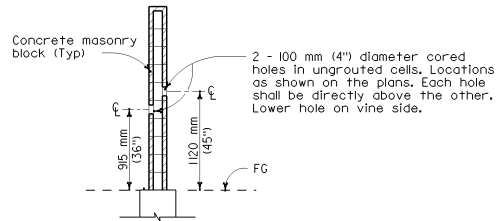
**PERSPECTIVE
VINE STAKING**



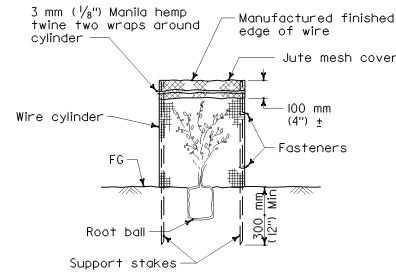
**SECTION
TREE STAKING**



**SECTION
ROOT PROTECTOR**



**SECTION
CORE HOLE (PLANT)**



**SECTION
FOLIAGE PROTECTOR**

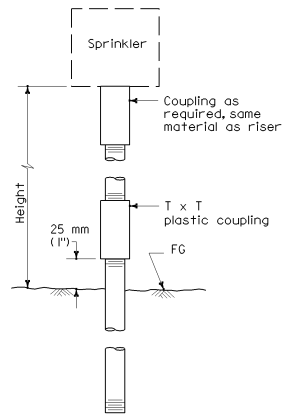
DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
<p><i>Gregory A. Balzer</i> REGISTERED LANDSCAPE ARCHITECT</p> <p>July 1, 2002 PLANS APPROVAL DATE</p> <p>The State of California or its officers or agents shall not be responsible for the accuracy or completeness or electronic copies of this plan sheet.</p> <p>Caltrans now has a web site! To get to the web site, go to https://www.dot.ca.gov</p>					
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STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**PLANTING AND IRRIGATION
DETAILS**

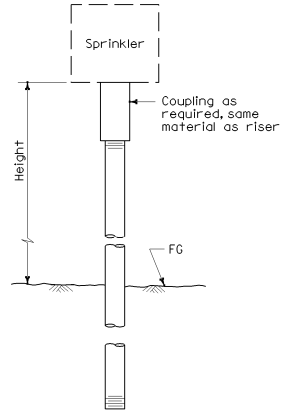
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NO SCALE

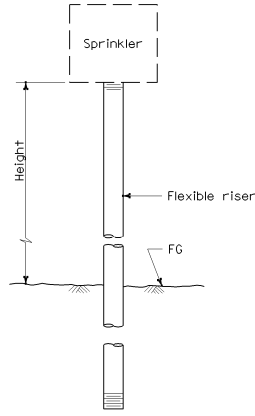
H4



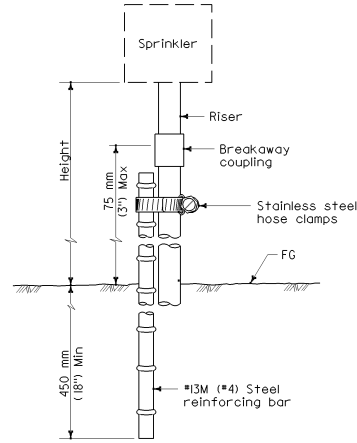
ELEVATION
RISER TYPE I



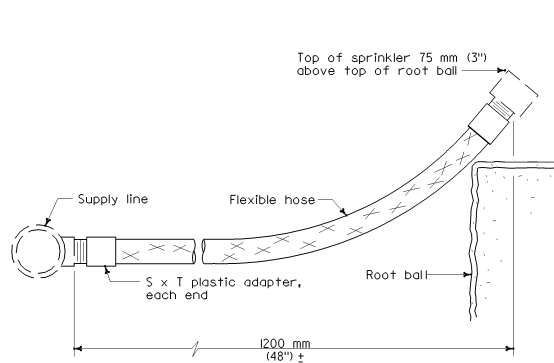
ELEVATION
RISER TYPE II



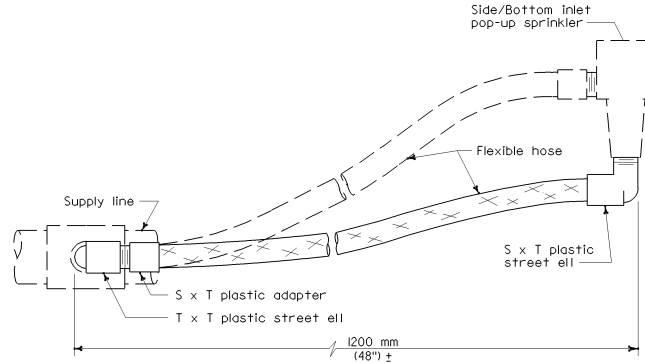
ELEVATION
RISER TYPE III



ELEVATION
RISER TYPE IV



ELEVATION
RISER TYPE V



ELEVATION
RISER TYPE VI

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	POST NO.	SHEET TOTAL SHEETS

REGISTERED LANDSCAPE ARCHITECT
Gregory A. Balzer
No. 2316
Ex. 2-28-03
STATE OF CALIFORNIA

July 1, 2002
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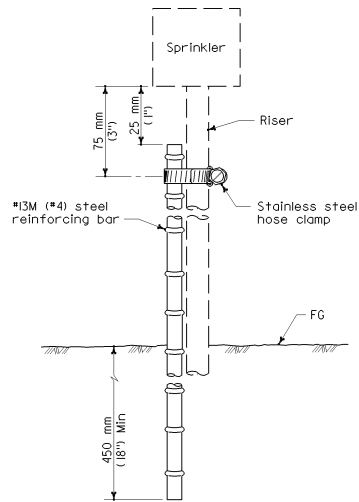
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DEPARTMENT OF TRANSPORTATION
**PLANTING AND IRRIGATION
DETAILS**

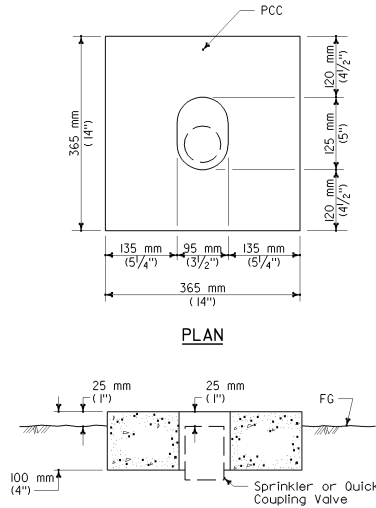
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NO SCALE

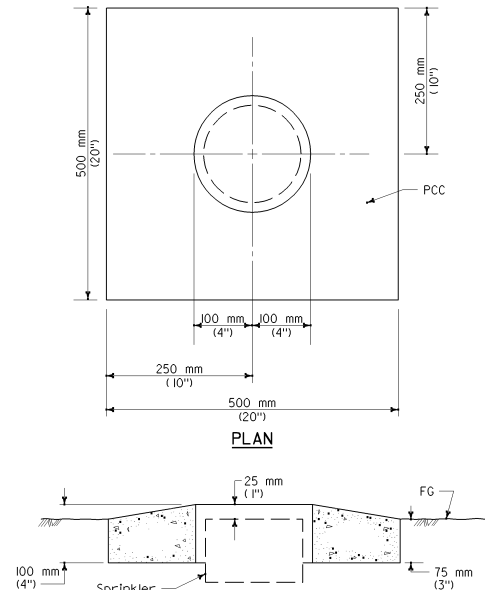
H5



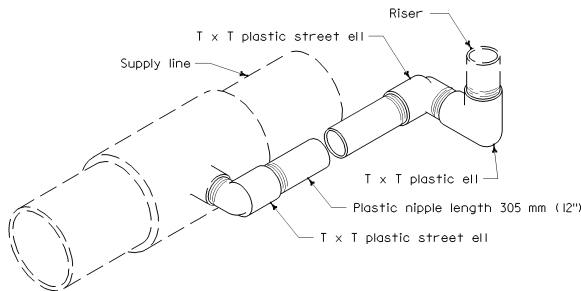
ELEVATION
RISER SUPPORT



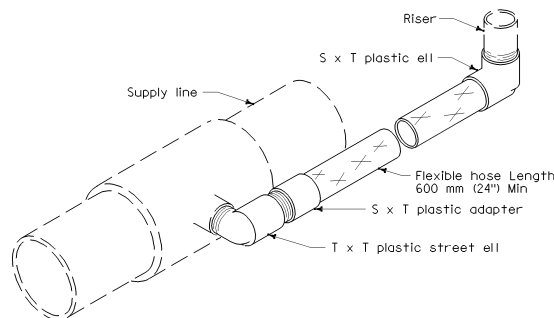
SECTION
SPRINKLER PROTECTOR TYPE I



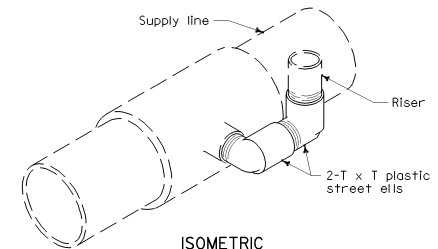
SECTION
SPRINKLER PROTECTOR TYPE II



ISOMETRIC
SWING JOINT TYPE I



ISOMETRIC
SWING JOINT TYPE II



ISOMETRIC
SWING JOINT TYPE III

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**PLANTING AND IRRIGATION
DETAILS**

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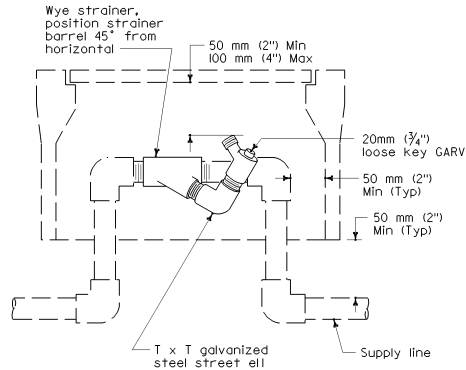
NO SCALE

H6

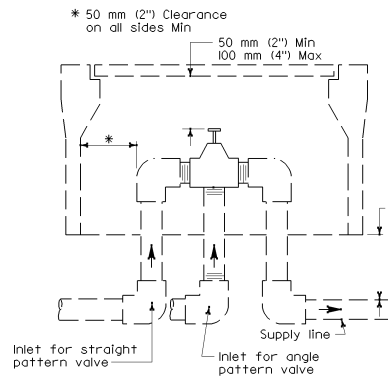
DIST.	COUNTY	ROUTE	KILOMETER TOTAL PROJECT	POST NO.	SHEET NO.	TOTAL SHEETS

REGISTERED LANDSCAPE ARCHITECT
Gregory A. Balzer
July 1, 2002
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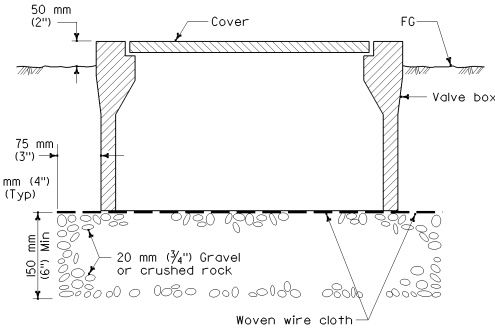
STATE OF CALIFORNIA
LANDSCAPE ARCHITECT
No. 2316
Exp. 2-28-03



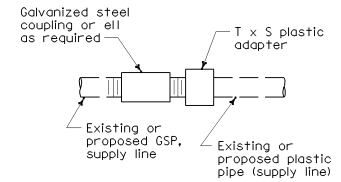
ELEVATION
WYE STRAINER



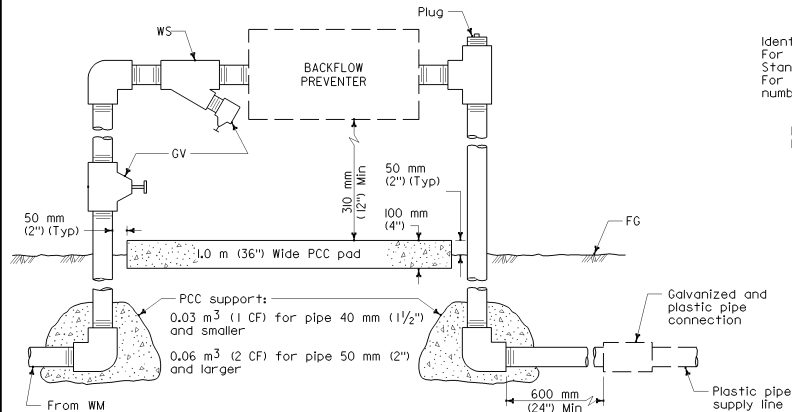
ELEVATION
VALVE



SECTION
VALVE BOX



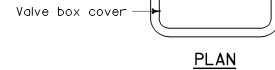
PLAN
GALVANIZED AND PLASTIC
PIPE CONNECTION



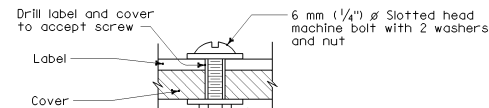
ELEVATION
BACKFLOW PREVENTER ASSEMBLY

Identification labels:
For abbreviations, see
Standard Plans H1 and H2.
For controller and station
number, see project plans.

Reclaimed water warning
label when required



PLAN



SECTION
VALVE BOX IDENTIFICATION

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PLANTING AND IRRIGATION DETAILS

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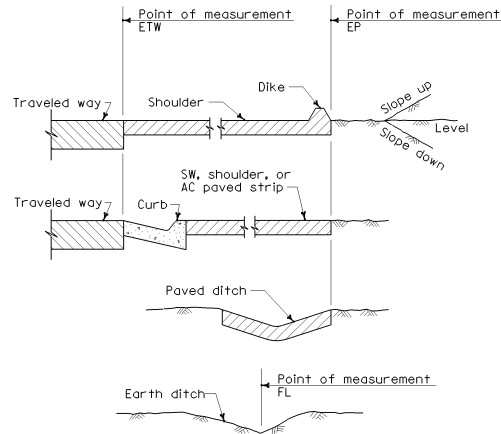
NO SCALE

H7

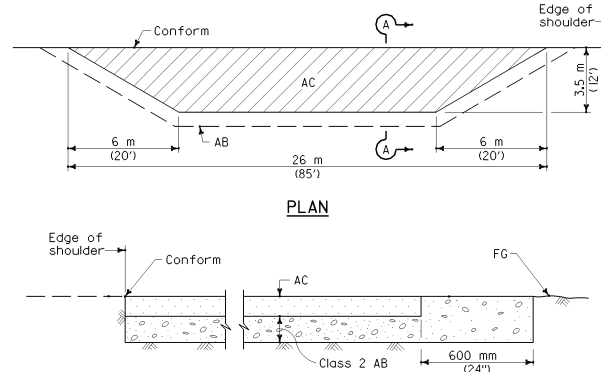
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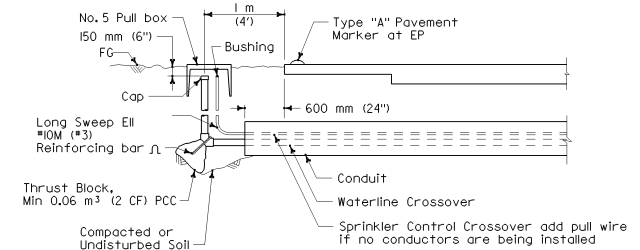
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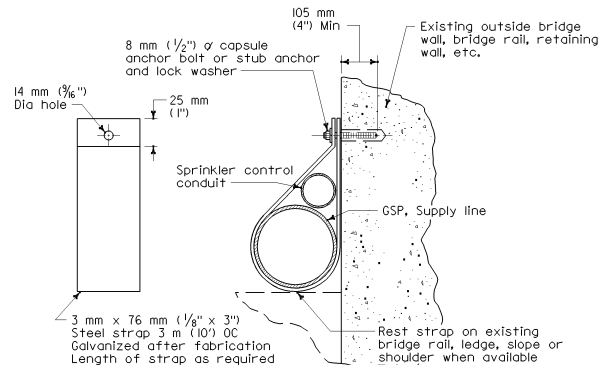
SECTION
POINTS OF MEASUREMENT



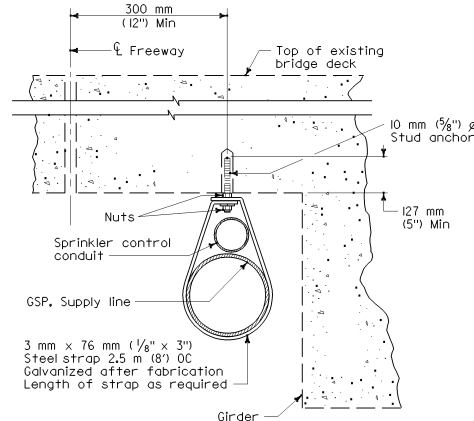
SECTION A-A
MAINTENANCE VEHICLE PULLOUT



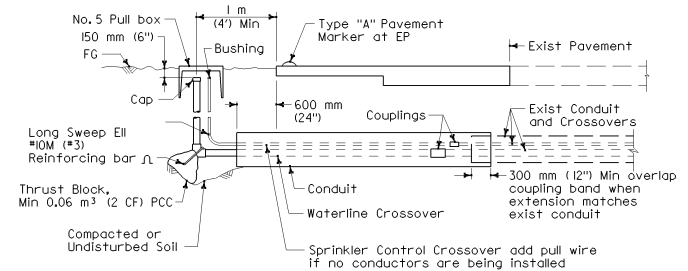
SECTION
IRRIGATION CROSSOVER



PIPE ANCHOR TYPE I



PIPE ANCHOR TYPE II



SECTION
EXTEND IRRIGATION CROSSOVER

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**PLANTING AND IRRIGATION
DETAILS**

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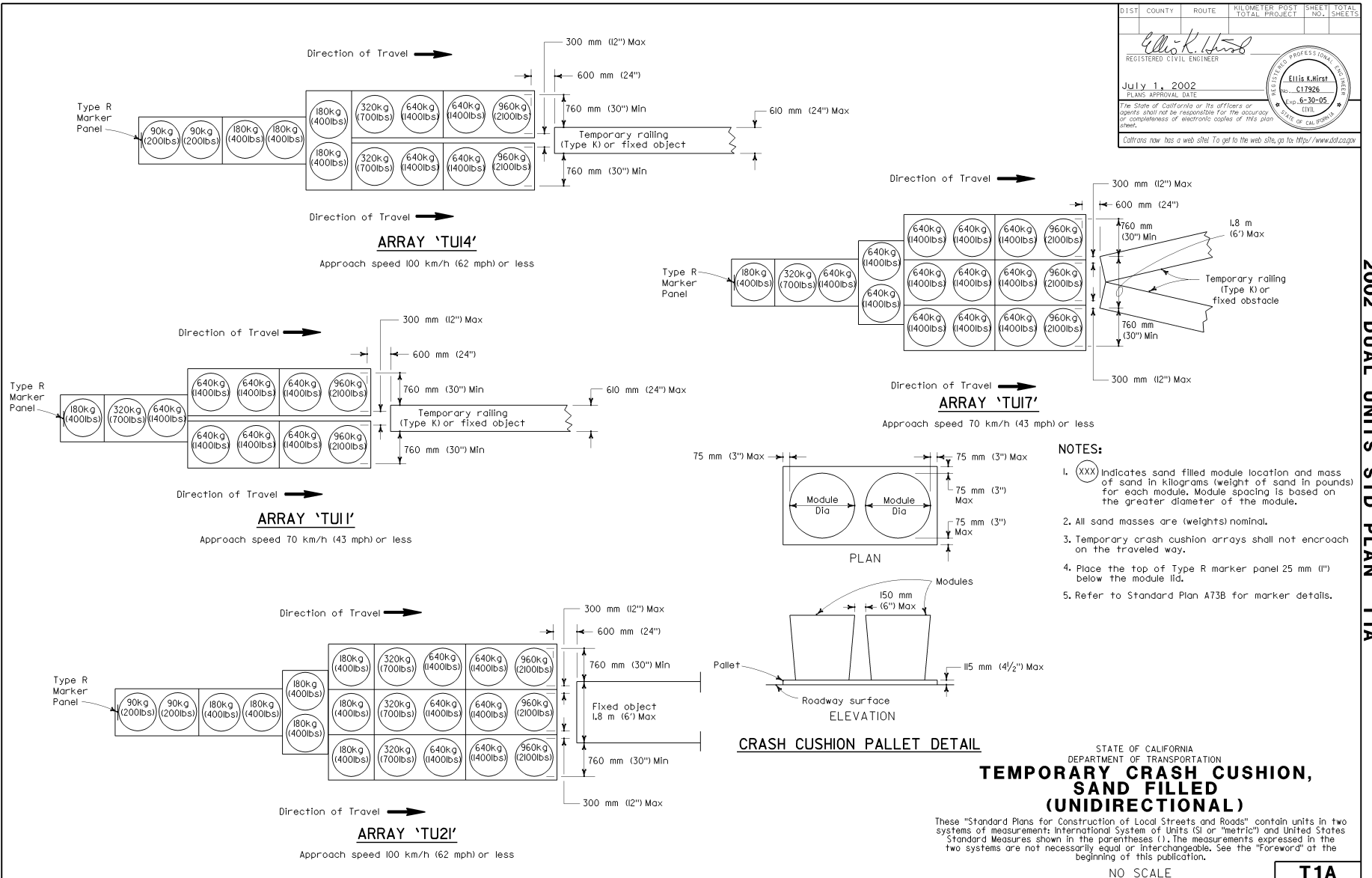
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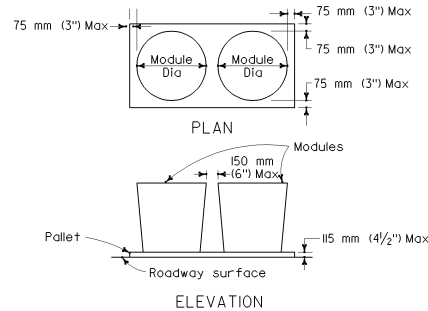
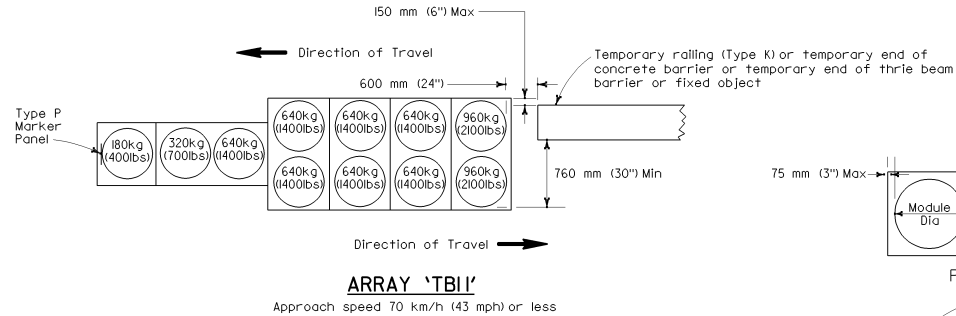
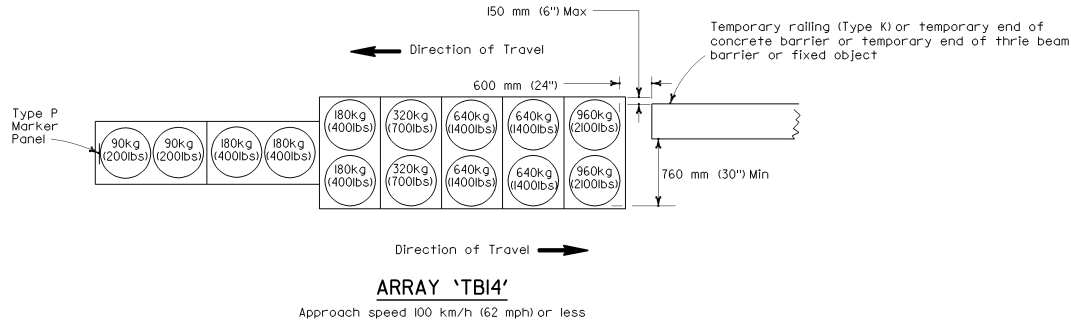
H8

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

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NOTES:

1. (XXX) Indicates sand filled module location and mass of sand in kilograms (weight of sand in pounds) for each module. Module spacing is based on the greater diameter of the module.
2. All sand masses (weight) are nominal.
3. Temporary crash cushion arrays shall not encroach on the traveled way.
4. Place the Type P marker panel so that the bottom of the panel rests upon the pallet.
5. Refer to Standard Plan A73B for marker details.

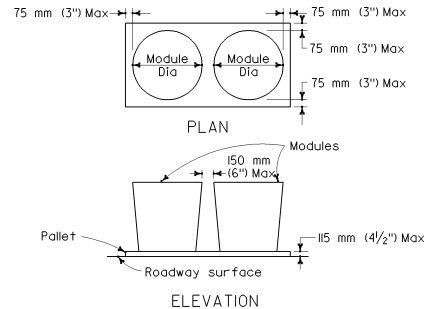
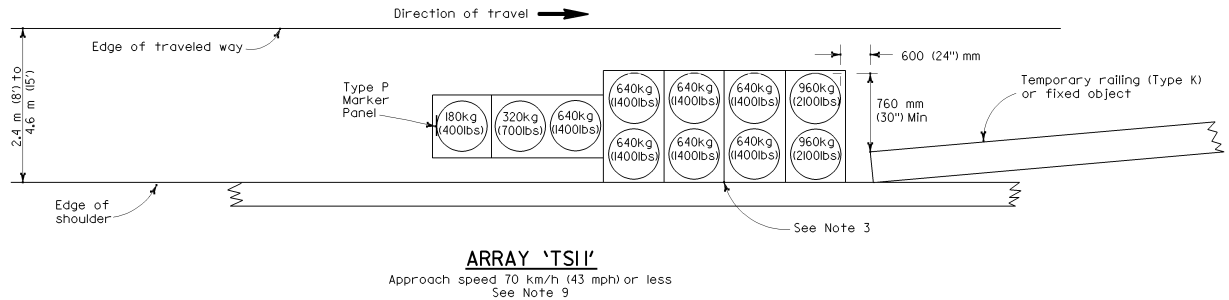
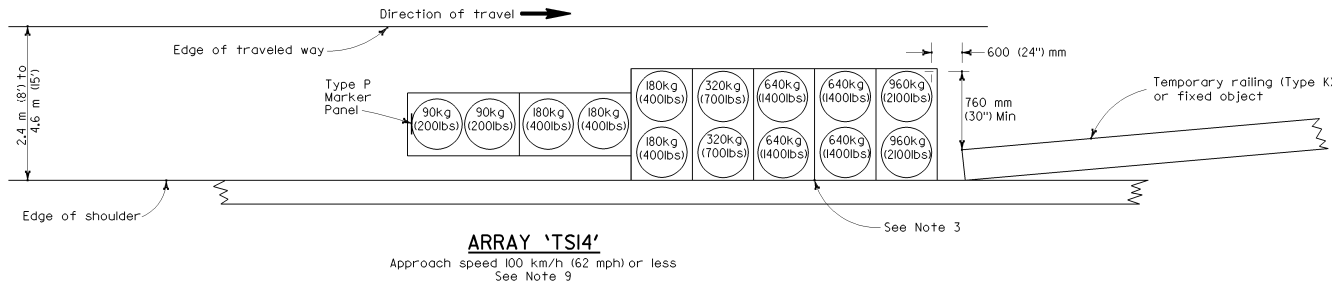
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**TEMPORARY CRASH CUSHION,
SAND FILLED
(BIDIRECTIONAL)**

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NO SCALE

T1B

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
<p><i>Ellis K. Hirst</i> REGISTERED CIVIL ENGINEER</p> <p>July 1, 2002 PLANS APPROVAL DATE</p> <p><small>The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.</small></p> <p><small>Caltrans now has a web site! To get to the web site, go to: http://www.dot.ca.gov</small></p>					
<p>STATE OF CALIFORNIA REGISTERED PROFESSIONAL ENGINEER <i>Ellis K. Hirst</i> No. C17926 Exp. 6-30-05 T1B</p>					



DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
REGISTERED CIVIL ENGINEER					
July 1, 2002					
PLANS APPROVAL DATE					
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NOTES:

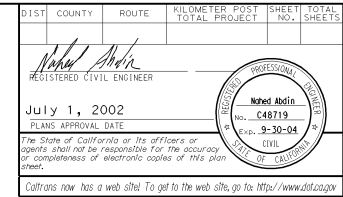
1. (XXX) Indicates sand filled module location and mass of sand in kilograms (weight of sand in pounds) for each module. Module spacing is based on the greater diameter of the module.
2. All sand masses (weights) are nominal.
3. The temporary crash cushion arrays shown on this plan shall be used only in locations where there will be traffic on one side of the temporary crash cushion array.
4. If the fixed object or approach end of the temporary railing is less than 4.60 m (15') from the edge of traveled way, a temporary crash cushion is required.
5. Temporary crash cushion arrays shall not encroach on the traveled way.
6. Arrays for median shoulders shall conform to details shown on this plan for outside shoulders.
7. Place the Type P marker panel so that the bottom of the panel rest upon the pallet and faces traffic.
8. Refer to Standard Plan A73B for marker details.
9. For shoulder widths less than 2.4 m (8'), appropriate approved crash cushion protection, other than sand filled modules, shall be provided at fixed objects and at approach ends of temporary railing. The specific type of crash cushion shall be as shown on the project plans or as specified in the Special Provisions, or if not shown on the project plans or specified in the Special Provisions, shall be as approved by the Engineer.
10. Approach speeds indicated conform to NCHRP 350 Report criteria.

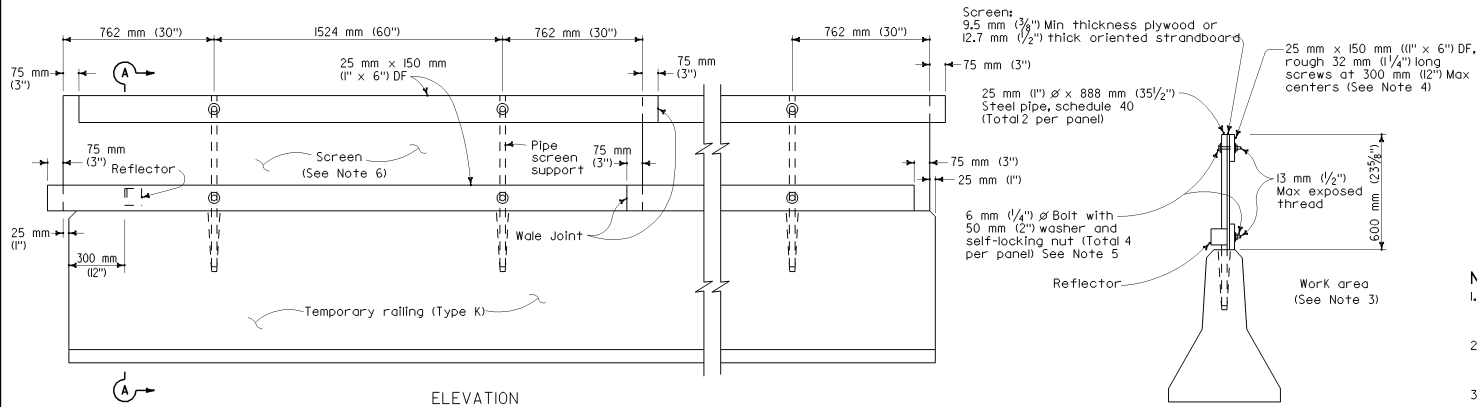
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**TEMPORARY CRASH CUSHION,
SAND FILLED
(SHOULDER INSTALLATIONS)**

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NO SCALE

T2





ELEVATION

SECTION A-A

Screen:
9.5 mm (3/8") Min thickness plywood or
12.7 mm (1/2") thick oriented strandboard.

25 mm (1") x 888 mm (35 1/2")
Steel pipe, schedule 40
(Total 2 per panel)

25 mm x 150 mm (1" x 6") DF,
rough 32 mm (1 1/4") long
screws at 300 mm (12") Max
centers (See Note 4)

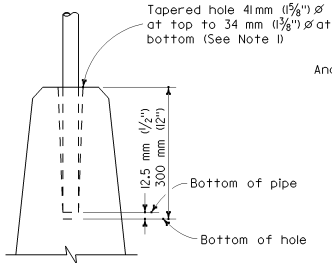
6 mm (1/4") x 80 Bolt with
50 mm (2") washer and
self-locking nut (Total 4
per panel) See Note 5

13 mm (1/2")
Max exposed
thread

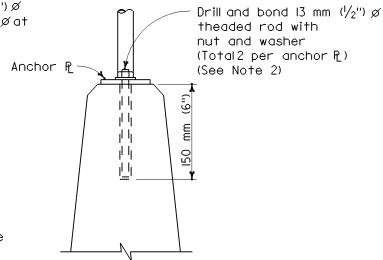
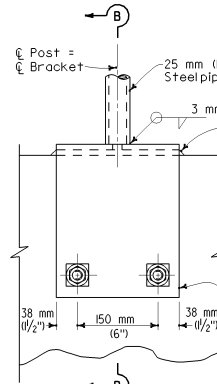
Work area
(See Note 3)

NOTE:

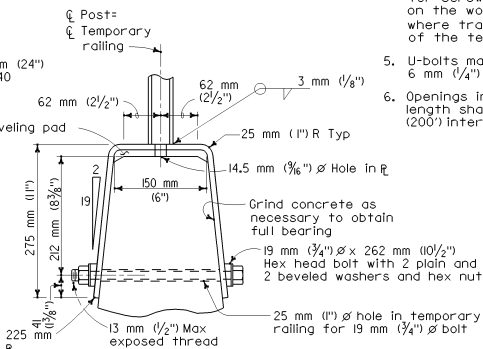
1. Straight holes 38 mm (1 1/2") ϕ of the depth shown may be used in lieu of the tapered holes.
2. Resin capsule-type anchorage devices may be substituted for threaded rods.
3. Place screen on work area side of the temporary railing where traffic will only be on one side of the temporary railing.
4. Clinched 8d box nails may be substituted for screws. The nails shall be clinched on the work area side of the screen where traffic will only be on one side of the temporary railing.
5. U-bolts may be substituted for 6 mm (1/4") ϕ bolts.
6. Openings in the screen of 1.0 m (3') length shall be provided at 60 m (200') intervals.



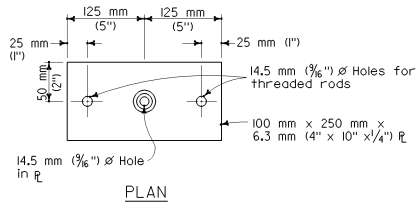
SCREEN ANCHORAGE DETAIL

SCREEN ANCHORAGE DETAIL
ALTERNATIVE 'A'

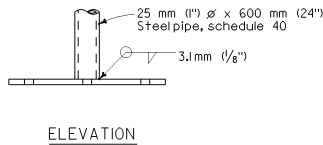
ELEVATION

SCREEN ANCHORAGE DETAIL
ALTERNATIVE 'B'

SECTION B-B



PLAN

ANCHOR PLATE DETAIL
ALTERNATIVE 'A'

ELEVATION

DIST	COUNTY	ROUTE	KILOMETER TOTAL PROJECT	POST NO.	SHEET NO.	TOTAL SHEETS

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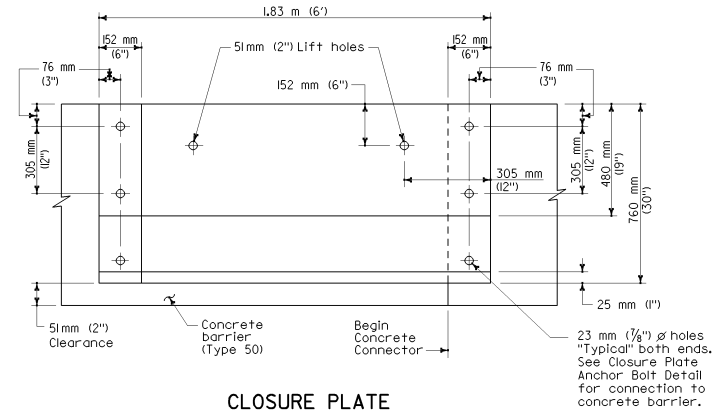
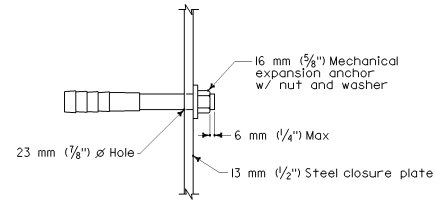
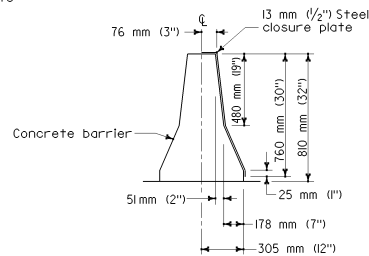
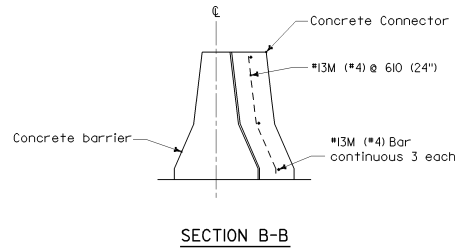
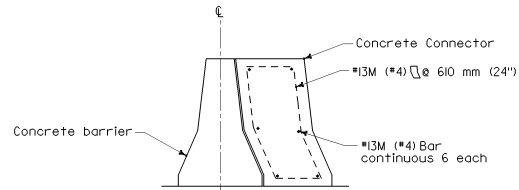
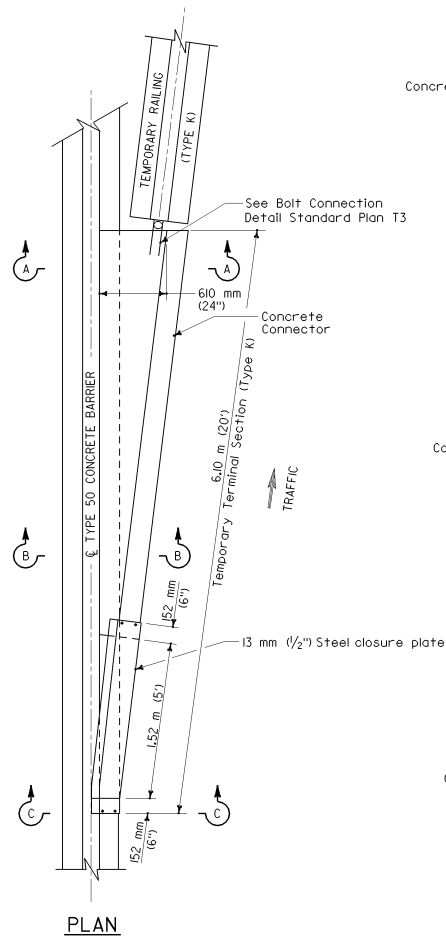
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 No. C17926
 Exp. 6-30-05
 STATE OF CALIFORNIA

TEMPORARY TRAFFIC SCREEN

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NO SCALE

T4



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DEPARTMENT OF TRANSPORTATION
**TEMPORARY TERMINAL SECTION
(TYPE K)**

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NO SCALE

T5

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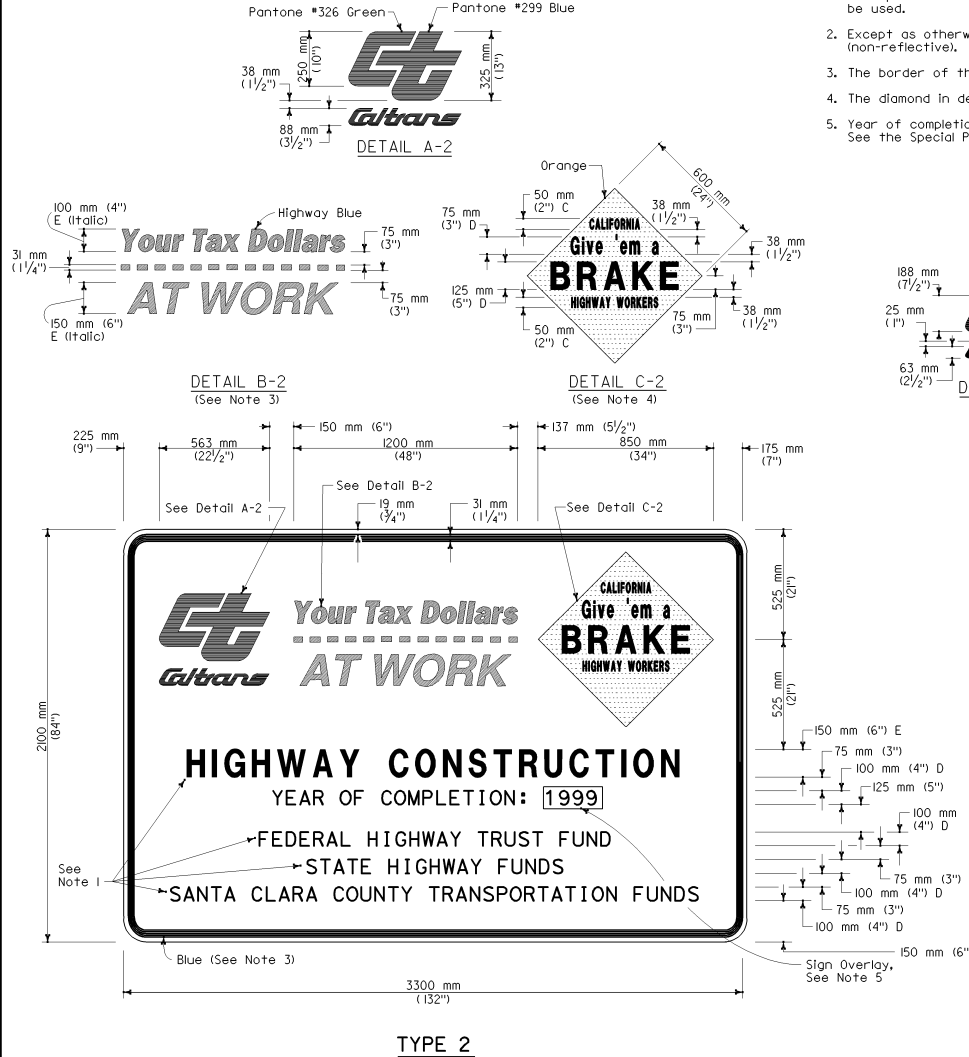
No. C17926

Exp. 6-30-05

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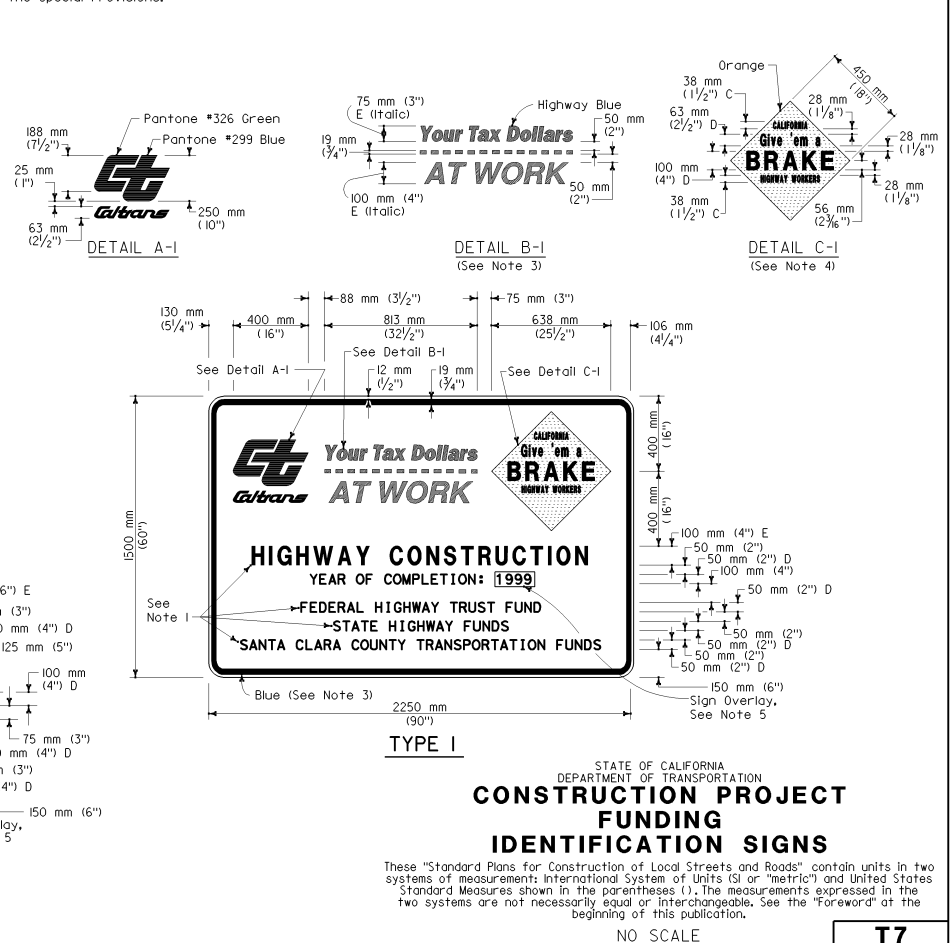
NOTE:

1. If lifting holes are used with the concrete connector, they shall conform to the lifting hole details shown on Standard Plan T3.
2. Paint closure plate white.
3. When the temporary terminal section (Type K) is no longer required and is to be removed, the anchor bolts connecting the closure plate and the barrier shall be removed or cut flush with the face of the concrete barrier. If the anchor bolts are removed, the resulting holes shall be filled with grout.



NOTES

- The sign messages shown for type of project and fund types are examples only. See the Special Provisions for the applicable type of project and fund type messages to be used.
- Except as otherwise shown, the legend of sign shall be black on a white background (non-reflective).
- The border of the signs and details "B-1" and "B-2" shall be blue (non-reflective).
- The diamond in details "C-1" and "C-2" shall be orange (non-reflective).
- Year of completion of project construction shown on the overlay is an example only. See the Special Provisions.



DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

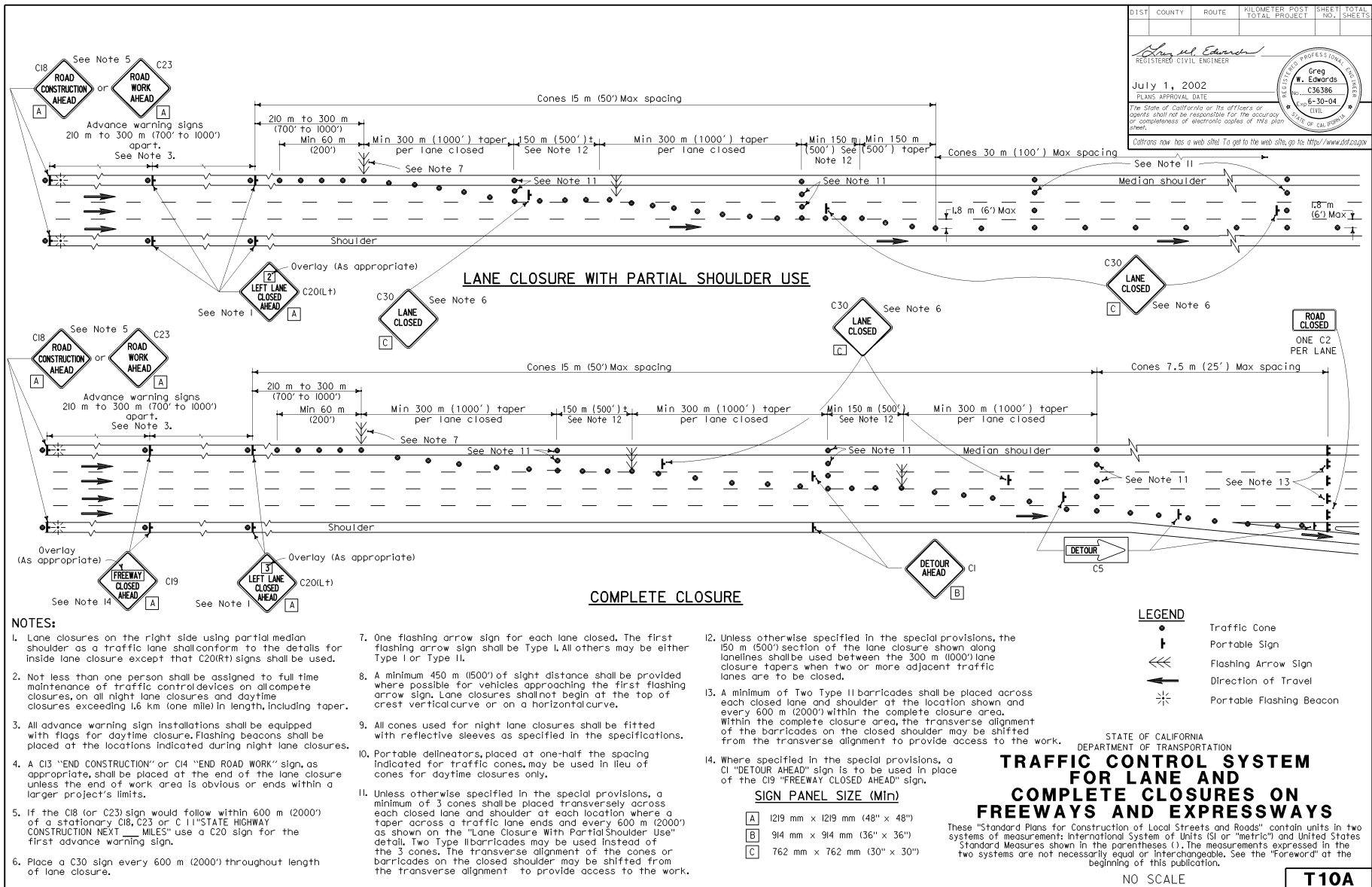
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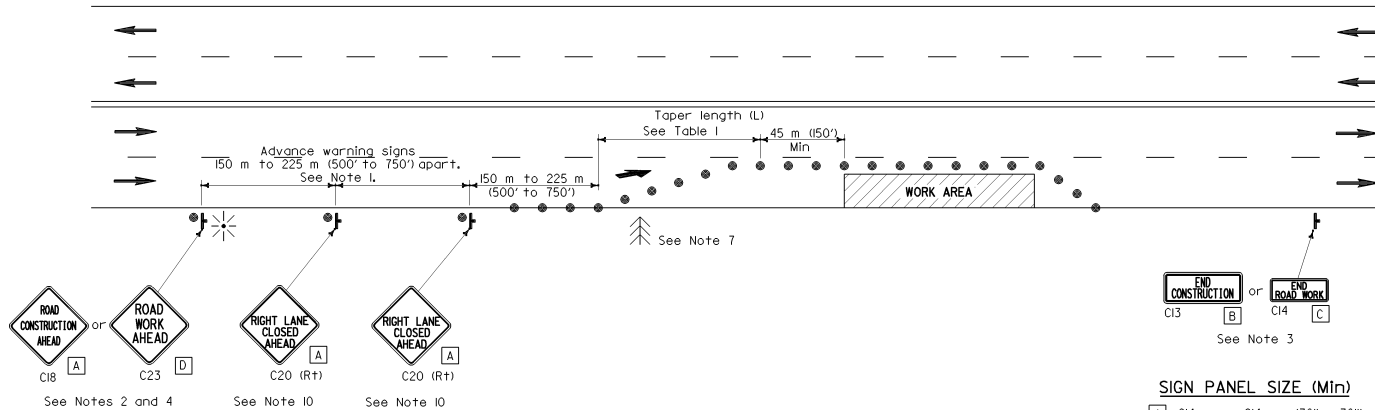
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TYPICAL LANE CLOSURE



SIGN PANEL SIZE (Min)

- [A] 914 mm x 914 mm (36" x 36")
 [B] 1219 mm x 457 mm (48" x 18")
 [C] 914 mm x 457 mm (36" x 18")
 [D] 762 mm x 762 mm (30" x 30")

LEGEND

- Traffic Cone
 T Portable Sign
 ← Direction of Travel
 Flashing Arrow Sign
 Portable Flashing Beacon

NOTES:

- Where approach speeds are low, signs may be placed at 90 m (300') spacing, and in urban areas, closer.
- All advance warning sign installations shall be equipped with flags for daytime closures. Flashing Beacons shall be placed at the locations indicated for nighttime closures.
- A C13 "END CONSTRUCTION" or C14 "END ROAD WORK" sign, as appropriate, shall be placed at the end of the lane closure unless the end of work area is obvious, or ends within a larger project's limits.
- If the C18 (or C23) sign would follow within 600 m (2000') of a stationary C18, C23, or C11 "STATE HIGHWAY CONSTRUCTION NEXT _____ MILES", use a C20 sign for the first advance warning sign.
- All cones used for night lane closures shall be fitted with reflective sleeves as specified in the specifications.
- Portable delineators, placed at one-half the spacing indicated for traffic cones, may be used in lieu of cones for daytime closures only.
- Flashing arrow sign shall be either Type I or Type II.
- The maximum spacing between cones in a taper shall be approximately as shown in Table I and 15 m (50') maximum spacing on tangent.
- For approach speeds over 80 km/h (50 mph), use the "Traffic Control System for Lane Closure On Freeways and Expressways" plan for lane closure details and requirements.
- Where specified in the special provisions, a W11 "LANE REDUCTION SYMBOL" sign is to be used in place of the C20 "RIGHT LANE CLOSED AHEAD" sign.

TABLE I

Approach Speed	*Taper Length (L)	*Number of Cones for Taper	Spacing of Cones Along Taper
0-40 km/h (0-25 mph)	38m (125')	6	7.5 m (25') ±
40-65 km/h (25-40 mph)	98 m (320')	9	12 m (40') ±
65-80 km/h (40-50 mph)	183 m (600')	13	15 m (50') ±
Over 80 km/h (50 mph)	See Note 9		

* Based on 3.6 (12') wide lane. This column is also appropriate for lane widths less than 3.6 m (12').

STATE OF CALIFORNIA
 DEPARTMENT OF TRANSPORTATION
**TRAFFIC CONTROL SYSTEM
 FOR LANE CLOSURE ON
 MULTILANE CONVENTIONAL
 HIGHWAYS**

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NO SCALE

T11

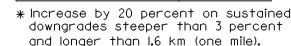
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TRAFFIC CONTROL SYSTEM FOR LANE CLOSURE ON TWO LANE CONVENTIONAL HIGHWAYS



Approach Speed	* (L)
0-50 km/h (0-30 mph)	60 m (200')
50-70 km/h (30-45 mph)	90 m (310')
over 70 km/h (45 mph)	150 m (500')

* Increase by 20 percent on sustained downgrades steeper than 3 percent and longer than 1.6 km (one mile).

1. Where approach speeds are low, signs may be placed at 90 m (300') spacing and in urban areas, closer.
2. All advance warning sign installations shall be equipped with flags for daytime closures. Flashing beacons shall be placed at the locations indicated during night lane closures.
3. A C13 "END CONSTRUCTION" or C14 "END ROAD WORK" sign, as appropriate, shall be placed at the end of the lane control unless the end of work area is obvious, or ends within a larger project's limits.
4. If the C18 or C23 sign would follow within 600 m (2000') of a stationary C8, C23, or C11 "STATE HIGHWAY CONSTRUCTION NEXT _____ MILES", use a C3A sign for the first advance warning sign.
5. All cones used for night lane closures shall be fitted with reflective sleeves as specified in the specifications.
6. Portable delineators, placed at one-half the spacing indicated for traffic cones, may be used in lieu of cones for daytime closures only.

7. Additional advance flaggers may be required. Flagger should stand in a conspicuous place, be visible to approaching traffic as well as approaching vehicles after the first vehicle has stopped. Nighttime flagger station shall be illuminated as provided in the current edition of the "Manual of Traffic Controls" published by the State of California, Department of Transportation. Place a minimum of four cones at 15 m (50') intervals in advance of flagger station as shown.
8. Place C30 "LANE CLOSED" sign at 150 to 300 m (500' to 1000') intervals throughout extended work areas. They are optional if the work area is visible from the flagger station.
9. When a pilot car is used, place a C37 "TRAFFIC CONTROL-WAIT FOR PILOT CAR" sign at all intersections within traffic control area. Signs shall be clean and visible at all times.

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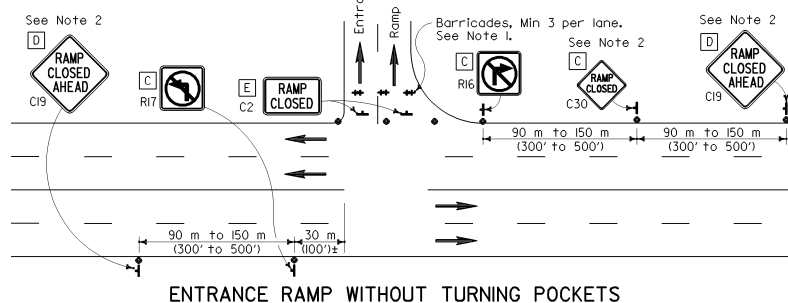
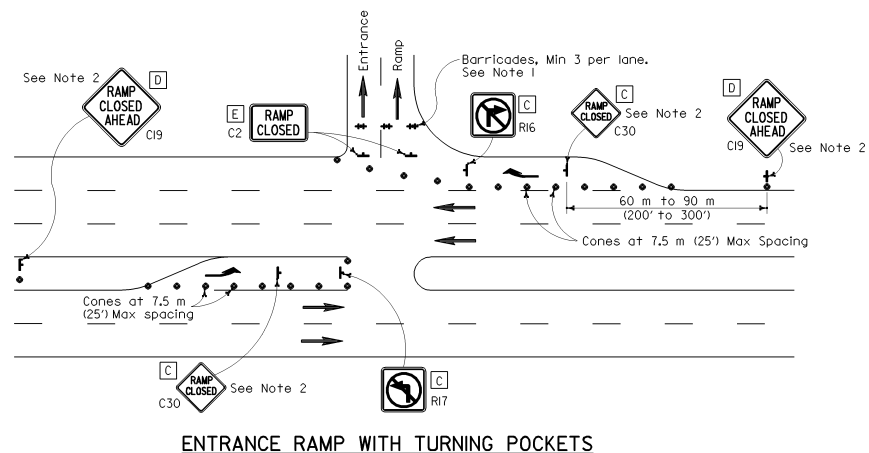
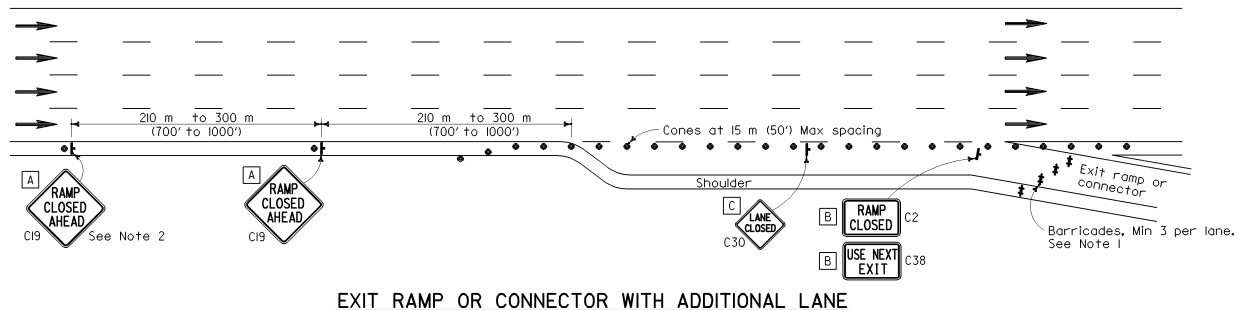
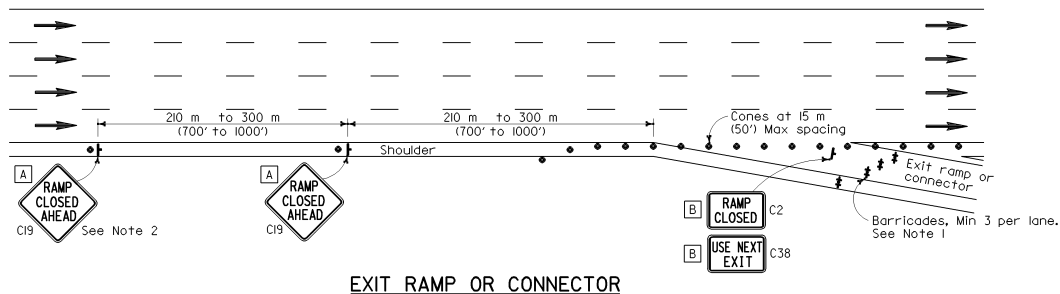
TRAFFIC CONTROL SYSTEM FOR LANE CLOSURE ON TWO LANE CONVENTIONAL HIGHWAYS

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NO SCALE

T13

TYPICAL RAMP CLOSURES



STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION TRAFFIC CONTROL SYSTEM FOR RAMP CLOSURE

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NO SCALE

T14

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NOTES

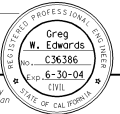
- Barricades shall be Type I, II, or III for closures lasting one week or less and Type III for closures lasting longer than one week.
- In lieu of placing the C19 "RAMP CLOSED AHEAD" and C30 "RAMP CLOSED" signs, black on orange overlay plates with the word "CLOSED" may be mounted, as directed by the Engineer, on all guide signs that refer to the closed ramp. The letter size on the overlay shall be the same as the guide sign.
- All advance warning sign installations shall be equipped with flags for daytime closures.
- All cones used for night lane closures shall be fitted with reflective sleeves as specified in the specifications.
- Portable delineators, placed at one-half the spacing indicated for traffic cones, may be used in lieu of cones for daytime ramp closures only.
- During nighttime ramp closures, at least one person shall be assigned full time for maintenance of traffic control devices.

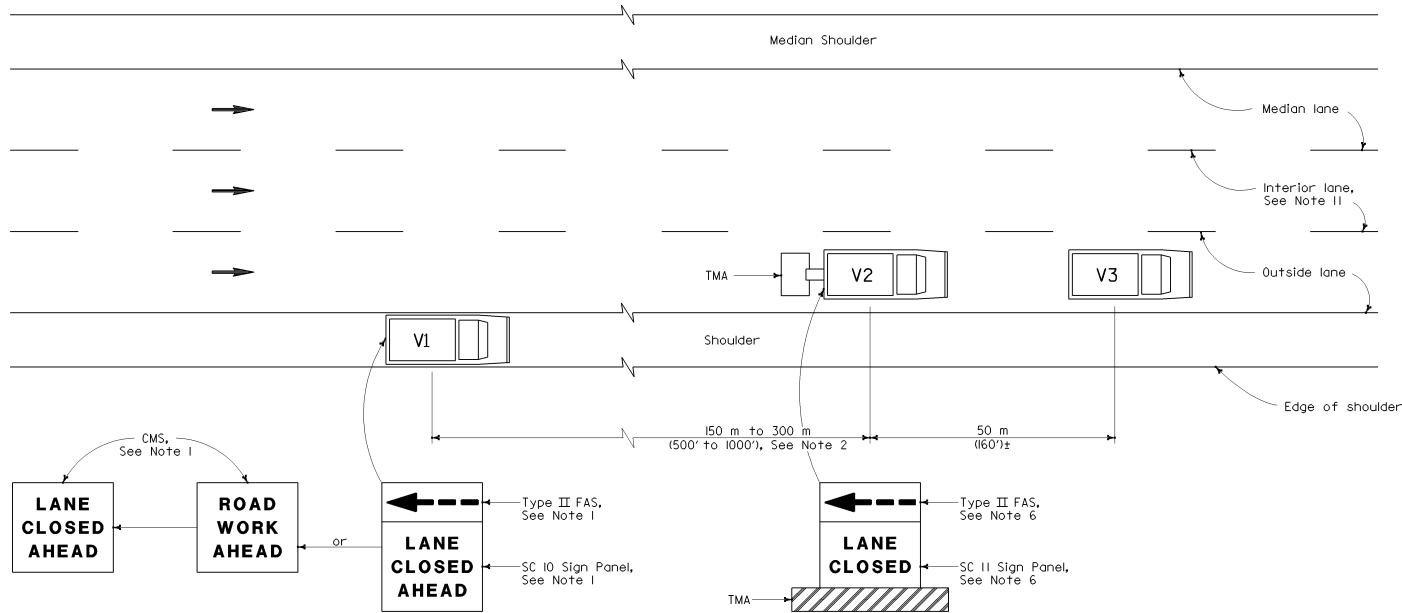
LEGEND

- Traffic Cone
- Sign
- Barricades
- Direction of Travel
- Turn Arrow

SIGN PANEL SIZE (Min)

- | | |
|---|-------------------------------|
| A | 1219 mm x 1219 mm (48" x 48") |
| B | 1219 mm x 762 mm (48" x 30") |
| C | 762 mm x 762 mm (30" x 30") |
| D | 914 mm x 914 mm (36" x 36") |
| E | 914 mm x 610 mm (36" x 24") |

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MOVING LANE CLOSURE ON MEDIAN OR OUTSIDE LANE OF MULTILANE HIGHWAYS

NOTES

1. Either the SC 10 sign panel shown or a changeable message sign shall be mounted on the rear of sign vehicle V1. A Type II flashing arrow sign shall be mounted on the rear of sign vehicle V1 and used with the SC 10 sign panel. A Type II flashing arrow sign will not be required with the changeable message sign provided the flashing arrow sign symbol may be displayed on the changeable message sign board. The changeable message sign shall be sequenced to show the "ROAD WORK AHEAD" message first, followed by the "LANE CLOSED AHEAD" message and then the flashing arrow sign symbol. For median lane closure, the flashing arrow sign symbol shall be reversed with the arrowhead on the right.
2. If traffic queues develop, sign vehicle V1 should be positioned upstream from the end of queue. Sign vehicle V1 shall be positioned where highly visible when shoulders are not available.
3. A minimum sight distance of 450 m (1500') should be provided in advance of sign vehicle V1.

4. Sign vehicle V1 should remain at the beginning of horizontal or vertical curves until the other vehicles (V2 and V3) are far enough beyond the curve to resume the minimum sight distance of 450 m (1500').
5. Vehicle-mounted sign panels shall be Type III or IV reflective sheeting, black on white or black on orange with 150 mm (6") minimum series D letters per Caltrans sign specifications.
6. Gross Vehicle Weight of shadow vehicle V2 shall be a minimum of 9000 kilograms (20,000 pounds) and shall be equipped with a truck-mounted attenuator (TMA). The sign panel shown and a Type II flashing arrow sign shall be mounted on the rear of shadow vehicle V2. For median lane closure, the flashing arrow sign symbol shall be reversed with the arrowhead on the right.
7. All vehicles used for lane closures shall be equipped with two-way radios and the vehicle operators shall maintain communication during the work or application operation.
8. All vehicles shall be equipped with flashing or rotating amber lights.

9. Where sufficient shoulder width is not available, sign vehicle V1 may encroach into the traffic lane staying as close to the edge of shoulder as practicable. When operating in this mode, both V1 and V2 shall be equipped with a truck-mounted attenuator (TMA) and Gross Vehicle Weight of V1 and V2 shall be a minimum of 9000 kilograms (20,000 pounds) each.
10. Where workers would be on foot in the work area, a stationary type lane closure (Standard Plan T10, T11, etc., as applicable) shall be used instead of this plan.
11. For moving lane closure on interior lane of multilane highways, see Standard Plan T16.

LEGEND

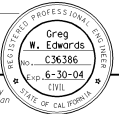
- V1 Sign Vehicle
- V2 Shadow Vehicle
- V3 Work/Application Vehicle
- FAS Flashing Arrow Sign
- CMS Changeable Message Sign
- TMA Truck-Mounted Attenuator
- ➔ Direction of Travel

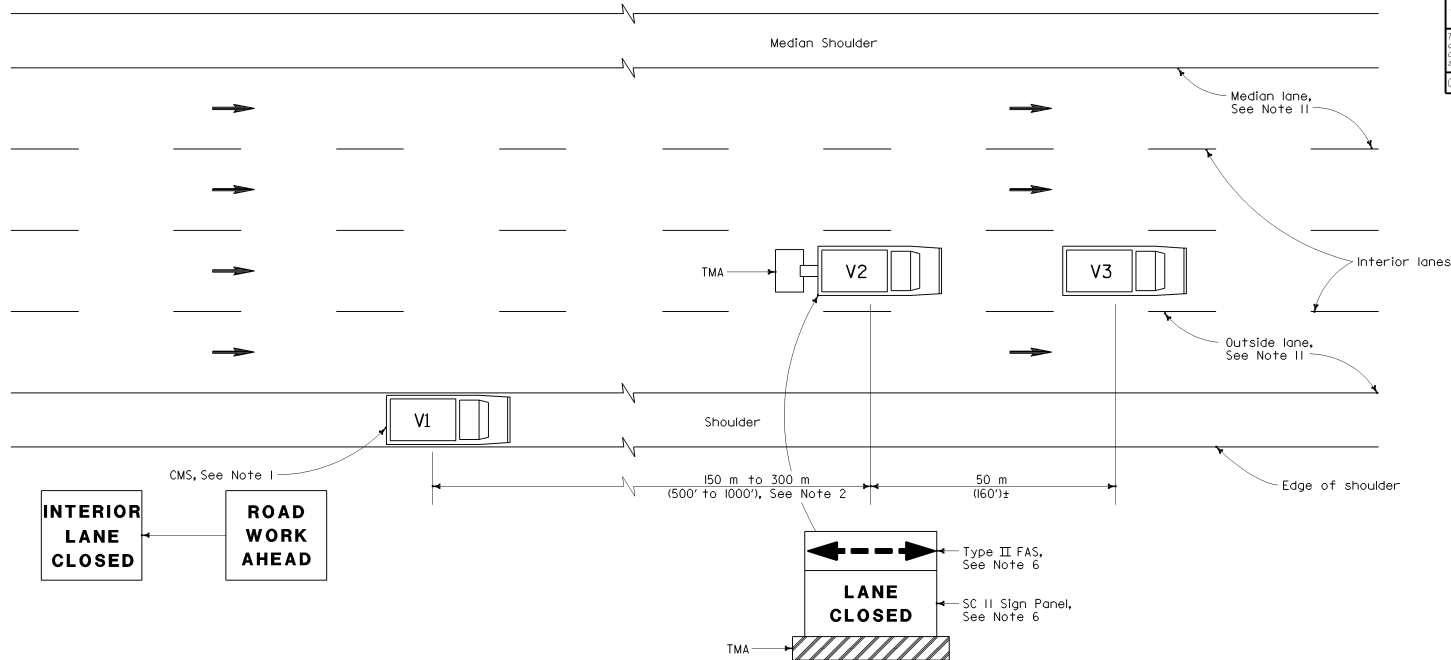
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NO SCALE

T15

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MOVING LANE CLOSURE ON INTERIOR LANE OF MULTILANE HIGHWAYS

NOTES

1. A changeable message sign shall be mounted on the rear of sign vehicle V1. The changeable message sign shall be sequenced to show the "ROAD WORK AHEAD" message first, followed by the "INTERIOR LANE CLOSED" message. The message "CENTER LANE CLOSED" may be used in place of the "INTERIOR LANE CLOSED" message.
2. If traffic queues develop, sign vehicle V1 should be positioned upstream from the end of queue. Sign vehicle V1 shall be positioned where highly visible when shoulders are not available.
3. A minimum sight distance of 450 m (1500') should be provided in advance of sign vehicle V1.
4. Sign vehicle V1 should remain at the beginning of horizontal or vertical curves until the other vehicles (V2 and V3) are far enough beyond the curve to resume the minimum sight distance of 450 m (1500').
5. Vehicle-mounted sign panels shall be Type III or IV reflective sheeting, black on white or black on orange with 150 mm (6") minimum series D letters per Caltrans sign specifications.
6. Gross Vehicle Weight of shadow vehicle V2 shall be a minimum of 9000 kilograms (20,000 pounds) and shall be equipped with a truck-mounted attenuator (TMA). The sign panel shown and a Type II flashing arrow sign shall be mounted on the rear of shadow vehicle V2. For median lane closure, the flashing arrow sign symbol shall be reversed with the arrowhead on the right.
7. All vehicles used for lane closures shall be equipped with two-way radios and the vehicle operators shall maintain communication during the work or application operation.
8. All vehicles shall be equipped with flashing or rotating amber lights.
9. Where sufficient shoulder width is not available, sign vehicle V1 may encroach into the traffic lane staying as close to the edge of shoulder as practicable. When operating in this mode, both V1 and V2 shall be equipped with a truck-mounted attenuator (TMA) and Gross Vehicle Weight of V1 and V2 shall be a minimum of 9000 kilograms (20,000 pounds) each.
10. Where workers would be on foot in the work area, a stationary type lane closure (Standard Plan T10, T11, etc., as applicable) shall be used instead of this plan.
11. For moving lane closure on median or outside lanes of multilane highways, see Standard Plan T15.

LEGEND

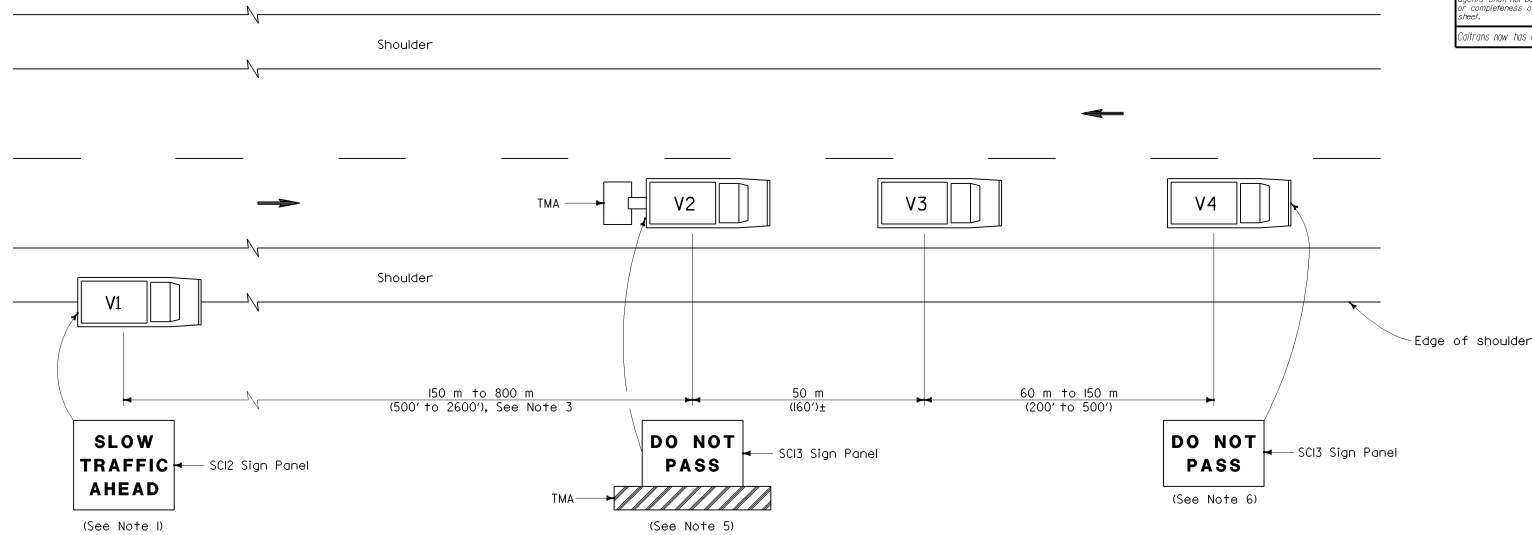
- V1 Sign Vehicle
- V2 Shadow Vehicle
- V3 Work/Application Vehicle
- FAS Flashing Arrow Sign
- CMS Changeable Message Sign
- TMA Truck-Mounted Attenuator
- Direction of Travel

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NO SCALE

T16



NOTES

1. Either the sign panel shown or a changeable message sign which can display the "SLOW TRAFFIC AHEAD" message shall be mounted on the rear of sign vehicle V1.
2. Sign vehicle V1 should be positioned where highly visible when shoulders are not available.
3. If traffic queues develop, sign vehicle V1 should be positioned upstream from the end of queue.
4. Vehicle-mounted sign panels shall be Type III or IV reflective sheeting, black on white or black on orange with 150 mm (6") minimum series D letters per Caltrans sign specifications.
5. Gross Vehicle Weight of shadow vehicle shall be a minimum of 9000 kilograms (20,000 pounds) and shall be equipped with a truck-mounted attenuator (TMA). The sign panel shown shall be mounted on the rear of shadow vehicle V2. The message "LANE CLOSED" may be used in place of the "DO NOT PASS" message.

6. The sign panel shown shall be mounted on the front of sign vehicle V4, facing opposing traffic. The message "CAUTION" may be used in place of the "DO NOT PASS" message.
7. All vehicles shall be equipped with flashing or rotating amber lights.
8. Sign vehicle V4 will not be required when the work and vehicles V2 and V3 are 0.6 m (2') or more from the centerline of the highway during the work or application operations.
9. All vehicles used for lane closures shall be equipped with two-way radios and the vehicle operators shall maintain communication during the work or application operation.
10. This plan shall not be used where workers would be on foot in the work area. Use a stationary type lane closure (Standard Plan T13) for this condition.

LEGEND

- V1 Sign Vehicle
- V2 Shadow Vehicle
- V3 Work/Application Vehicle
- V4 Sign Vehicle
- TMA Truck-Mounted Attenuator
- ➔ Direction of Travel

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION TRAFFIC CONTROL SYSTEM FOR MOVING LANE CLOSURE ON TWO LANE HIGHWAYS

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NO SCALE

T17

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Greg W. Edwards

No. C36386

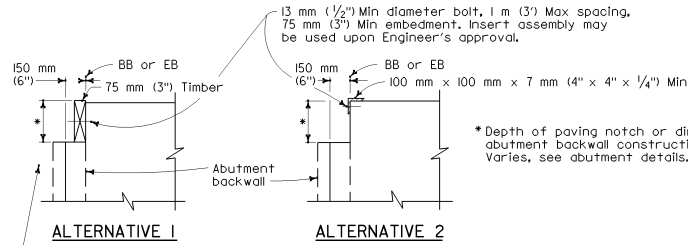
Exp. 6-30-04

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BRIDGE PLAN ABBREVIATIONS

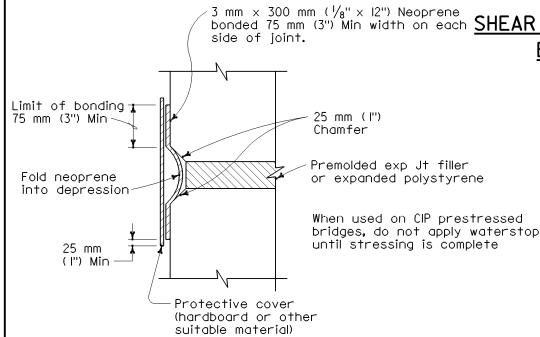
See Standard Plan A10A for additional abbreviations

Brg	Bearing
CG	Center of gravity
CIP	Cast-in-place
Cont	Continuous
FS	For side
IF	Inside face
NS	Near side
OF	Outside face
J	Outer, outer left bridge
K	Outer left bridge
S	Outer right bridge
T	Outer, outer right bridge
T&B	Top and bottom

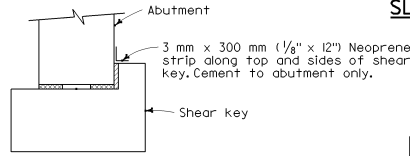


ALTERNATIVE 1
TEMPORARY BUMPERS
BRIDGE DETAIL I-2

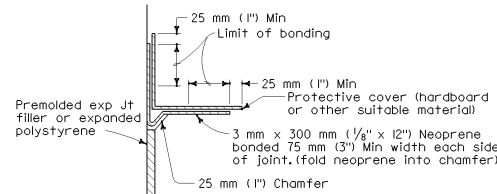
Top of bumper to be at or above the top of deck concrete. Bumpers and bolts to be removed immediately prior to placing approach pavement.



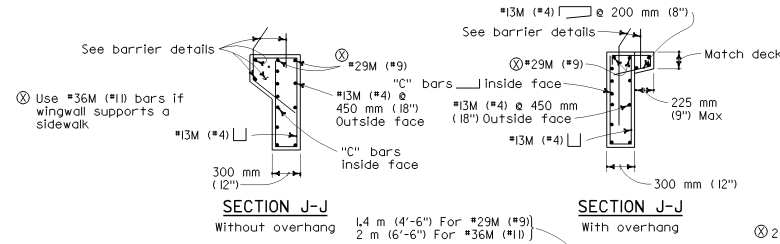
STRIP WATERSTOP DETAIL
BRIDGE DETAIL I-3



SHEAR KEY JOINT PROTECTION
BRIDGE DETAIL I-6

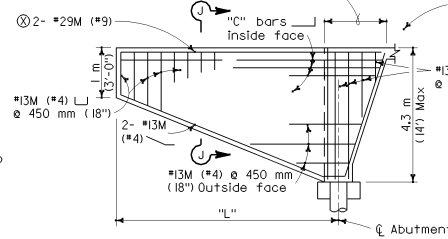


STRIP WATERSTOP CORNER DETAIL
BRIDGE DETAIL I-4

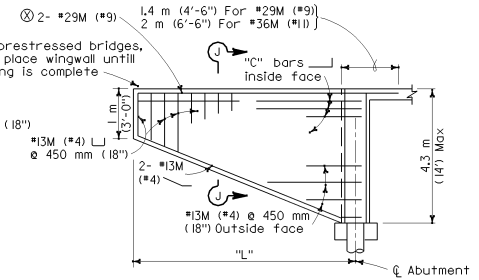


SECTION J-J
Without overhang

SECTION J-J
With overhang

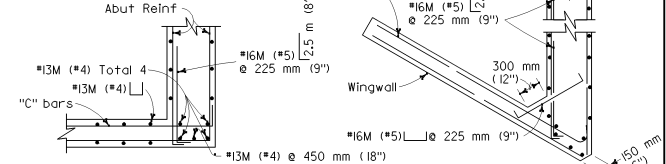


ELEMENT
SLOPING ABUTMENT



ELEMENT
VERTICAL ABUTMENT

"L" Bars	"C" Bars
3.7 m (12')	#16M (#5) @ 225 mm (9")
4.3 m (14')	#19M (#6) @ 225 mm (9")
5.0 m (16')	#22M (#7) @ 225 mm (9")
5.5 m (18')	#25M (#8) @ 225 mm (9")
6.0 m (20')	#29M (#9) @ 225 mm (9")



CORNER DETAIL
FOR SKEW 20° AND LESS

CORNER DETAIL
FOR SKEW OVER 20°

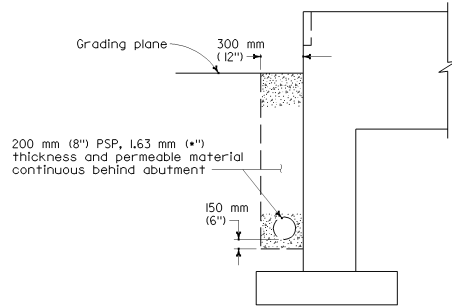
WINGWALLS FOR DIAPHRAGM ABUTMENT
BRIDGE DETAIL I-5

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DEPARTMENT OF TRANSPORTATION
BRIDGE DETAILS

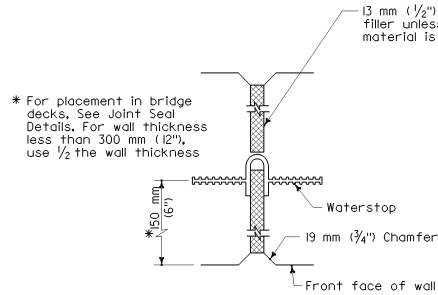
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NO SCALE

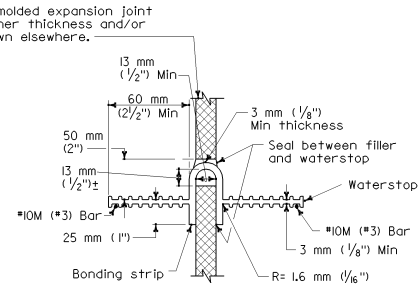
B0-1



**200 mm PSP AND PERMEABLE MATERIAL
BRIDGE DETAIL 3-5**



**WALL EXPANSION JOINT
BRIDGE DETAIL 3-4**



**WATERSTOP
BRIDGE DETAIL 3-6**

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
<p><i>Overcomer Y. Hor</i> REGISTERED CIVIL ENGINEER</p> <p>July 1, 2002 PLANS APPROVAL DATE</p> <p>The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.</p> <p>Caltrans now has a web site! To get to the web site, go to http://www.dot.ca.gov</p>					

REGISTERED PROFESSIONAL ENGINEER

Overcomer Y. Hor

No. C45803

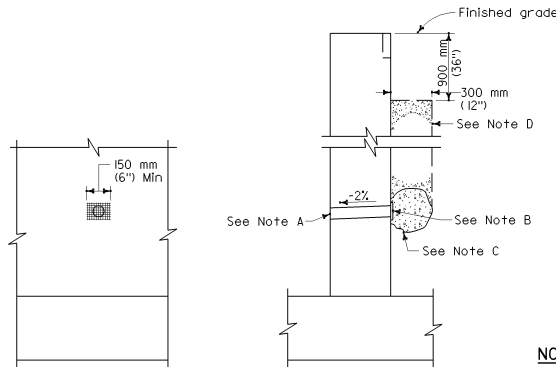
Exp. 12-31-06

STATE OF CALIFORNIA

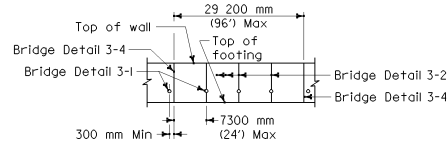
NOTES

Holes will be permitted in the outer 13 mm (1/2") of the web for wire, rings, etc.
Tie web to 10M (#3) reinforcing bars @ 400 mm (16") maximum intervals to support the waterstop in proper position during concrete placement. Alternative detail may be submitted for approval of the Engineer.

Waterstop to have 5 or more pairs of raised ribs to provide 65 mm² (one square inch) minimum rib cross-section area on each half of the waterstop.

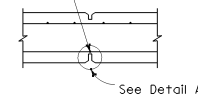


**ELEVATION
WEEP HOLE AND PERVIOUS BACKFILL
BRIDGE DETAIL 3-1**

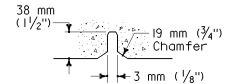


**WALL EXPANSION JOINTS
AND WEAKENED PLANES
BRIDGE DETAIL 3-3**

Cut or butt every other front face horizontal bar at Bridge Detail 3-2



SECTION



DETAIL A

**WEAKENED PLANES
BRIDGE DETAIL 3-2**

NOTES

A. 100 mm (4") ϕ Drains @ 7600 mm (25') maximum center to center, 2750 mm (9') center to center for Type 3 and 2800 mm (9'-3") center to center for Type 4 retaining walls. For walls adjacent to sidewalks or curbs, provide 100 mm (4") plastic pipe under the sidewalk to discharge thru curb face. Exposed wall drains shall be located 75 mm (3") \pm above finished grade.

B. 150 mm (6") Square aluminum or galvanized steel wire 6 mm (1/4") mesh hardware cloth, minimum wire diameter 0.64 mm (0.025"). Anchor firmly to backface.

C. 0.03 cubic meter (1 cubic foot) pervious backfill material in a nonwoven filter fabric, securely tied.

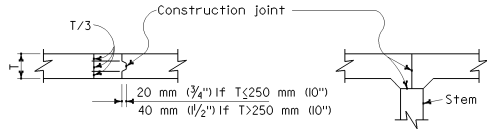
D. Pervious backfill material continuous behind retaining wall or abutment.

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BRIDGE DETAILS

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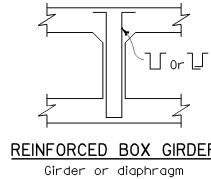
NO SCALE

B0-3

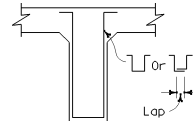


BRIDGE DETAIL 5-2
Top or bottom slab

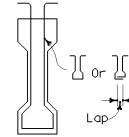
BRIDGE DETAIL 5-3



REINFORCED BOX GIRDER
Girder or diaphragm





T-BEAM
Girder, bent cap or diaphragm
A reinforcement bar must be placed inside of each stirrup hook or 90° bend.



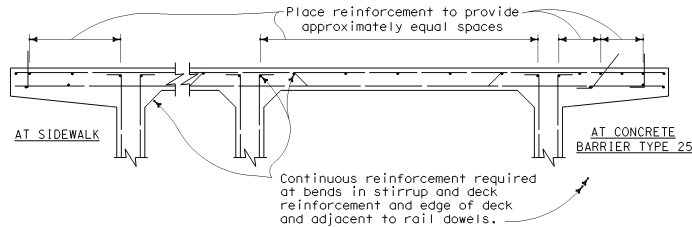
PRECAST GIRDER

Stirrup Size	Lap
#13 M (#4)	125 mm (5")
#16 M (#5)	150 mm (6")
#19 M (#6)	200 mm (7 1/2")
#22 M (#7)	225 mm (9")
#25 M (#8)	250 mm (10")

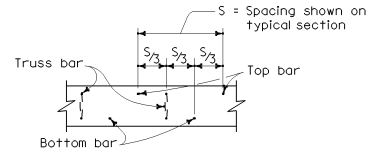
DIST.	COUNTY	ROUTE	KILOMETER TOTAL PROJECT	POST NO.	SHEET NO.	TOTAL SHEETS
 REGISTERED CIVIL ENGINEER July 1, 2002 PLANS APPROVAL DATE The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet. Caltrans now has a web site! To get to the web site, go to: http://www.dot.ca.gov						
						

DECK CONSTRUCTION JOINTS

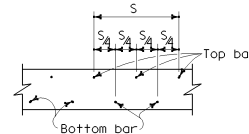
BRIDGE DETAIL 5-5 ALTERNATIVE STIRRUPS



BRIDGE DETAIL 5-15
TOP GIRDER REINFORCEMENT



BRIDGE DETAIL 5-10



BRIDGE DETAIL 5-11
TRANSVERSE DECK REINFORCEMENT
SPACING DIAGRAMS

NOTES:

The Contractor shall submit a deck placing schedule which will be subject to the approval of the Engineer. Unless shown otherwise on the plans, the following conditions shall be provided for:

1. Transverse joints will not be permitted in simple spans unless approved by the Engineer. For continuous spans, transverse joints may be located at about the 1/4 point of span. If the deck is placed over continuous steel or precast concrete girders, the portion over the supports shall be placed last.
2. Longitudinal joints shall be located at the edge of a traffic lane unless otherwise permitted by the Engineer.
3. For decks supported on precast concrete girders, the intermediate and end diaphragms shall be placed at least five days before the deck.
4. For deck supported on structural steel, the crossframes for the entire width of bridge shall be in place.
5. Reinforcing steel shall be continuous thru all construction joints.

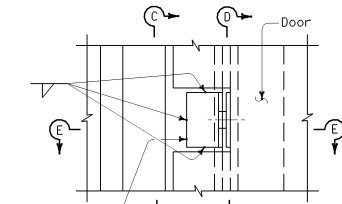
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

BRIDGE DETAILS

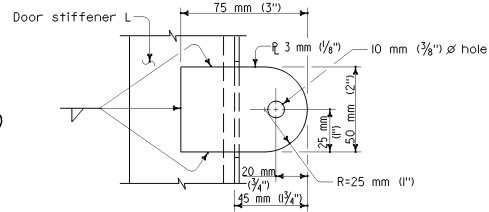
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NO SCALE

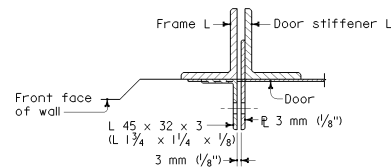
B0-5



ELEVATION

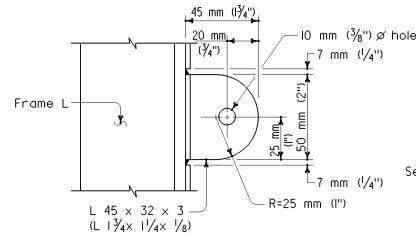


SECTION D-D

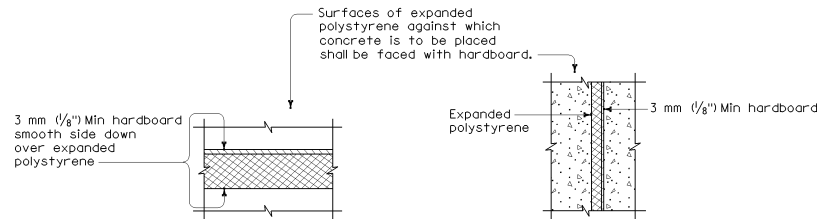


SECTION E-E

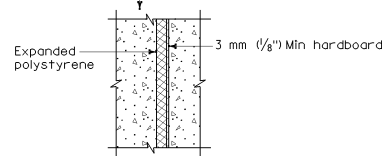
HASP DETAIL



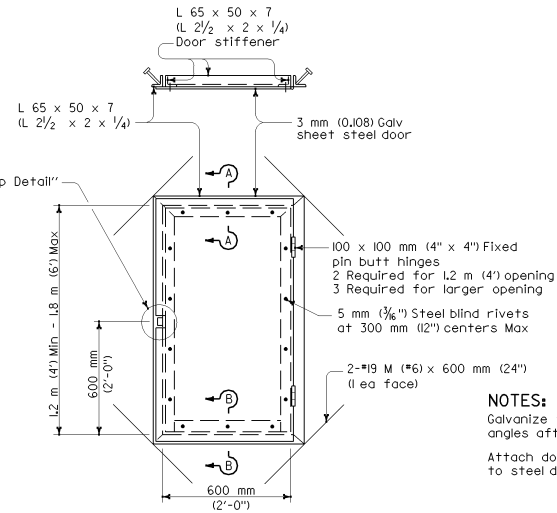
SECTION C-C



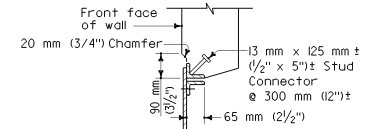
PROTECTION OF
HORIZONTAL POLYSTYRENE
BRIDGE DETAIL 13-1



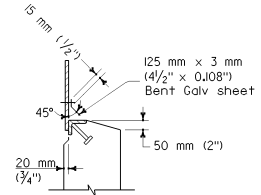
PROTECTION OF
VERTICAL POLYSTYRENE
BRIDGE DETAIL 13-2



ACCESS DOOR



SECTION A-A



SECTION B-B

NOTES:
Galvanize frame assemblies and door stiffener angles after welding and fabrication.
Attach door stiffener angles and bent sheet to steel door with blind rivets.

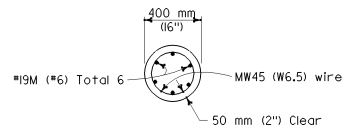
BRIDGE DETAIL 13-3

BRIDGE DETAILS

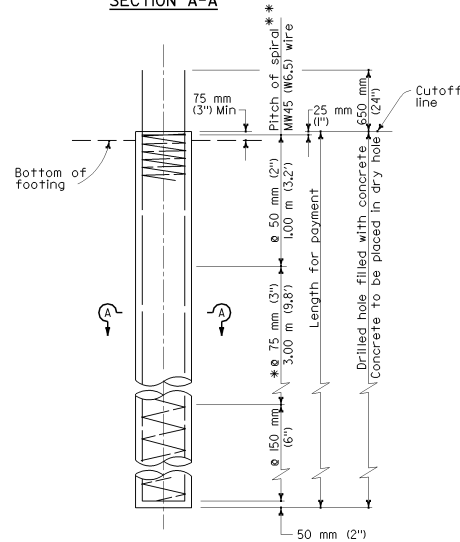
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NO SCALE

B0-13



SECTION A-A



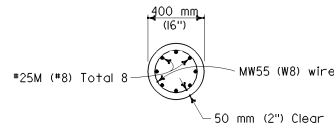
ELEVATION

400 KILONEWTON (45 ton) AND 625 KILONEWTON (70 ton)

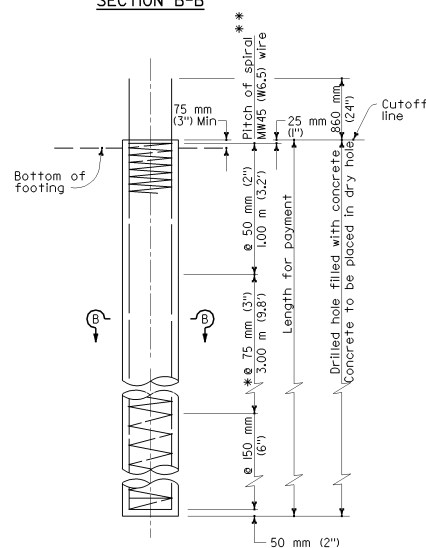
DESIGN CAPACITY

* ϕ 50 mm (2") at option of contractor.

** Extend at 50 mm (2") pitch to top of anchor piles and load test piles.
For additional longitudinal reinforcement for anchor piles and load test piles,
see "Load Test Piles Details (2)", Standard Plan B2-10.



SECTION B-B



ELEVATION

900 KILONEWTON (100 ton)

DESIGN CAPACITY

NOTES

Reinforcement extending into footing shall be hooked as required to provide clearance to top of footing.

Lapped splices in spiral pile reinforcement shall be lapped at least 80 wire diameters. Spiral pile reinforcement at splices and at ends shall be terminated with a 135° hook with a 150 mm (6") tail hooked around a longitudinal bar.

Piles shall be extended only in accordance with details shown in the Project Plans.

DESIGN NOTES

Reinforced Concrete
 $f_y = 420$ MPa (60,000 psi)
 $f'_c = 28$ MPa (4,000 psi)

DESIGN CAPACITY

400 KILONEWTON (45 ton) and 625 KILONEWTON (70 ton) Pile

Compression =
 625 kN (70 ton) [Service state]
 1250 kN (140 ton) [Nominal axial resistance]

Tension =
 625 kN (70 ton) [Nominal axial resistance]

900 KILONEWTON (100 ton) Pile

Compression =
 900 kN (100 ton) [Service state]
 1800 kN (200 ton) [Nominal axial resistance]

Tension =
 900 kN (100 ton) [Nominal axial resistance]

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION 400 mm (16") CAST-IN- DRILLED-HOLE CONCRETE PILE

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NO SCALE

B2-3

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

Daniel T. Adams
 REGISTERED CIVIL ENGINEER

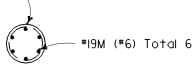
July 1, 2002
 PLANS APPROVAL DATE

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Professional Engineer Seal:
 Daniel T. Adams
 No. C48418
 Exp. 6-30-03
 STATE OF CALIFORNIA

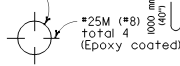
Class 400 = PP360 x 4.55
(Class 45 = PP14 x 0.179)
Class 625 = PP360 x 6.35
(Class 70 = PP14 x 0.250)



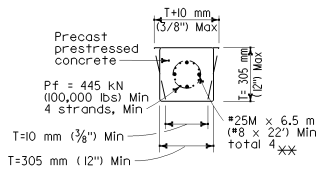
SECTION V-V

PP = Steel pipe pile

Class 400 = PP360 x 9.53
(Class 45 = PP14 x 0.375)
Class 625 = PP360 x 11.2
(Class 70 = PP14 x 0.438)

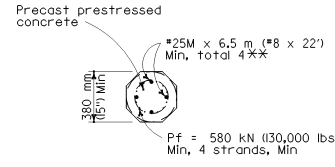


SECTION W-W



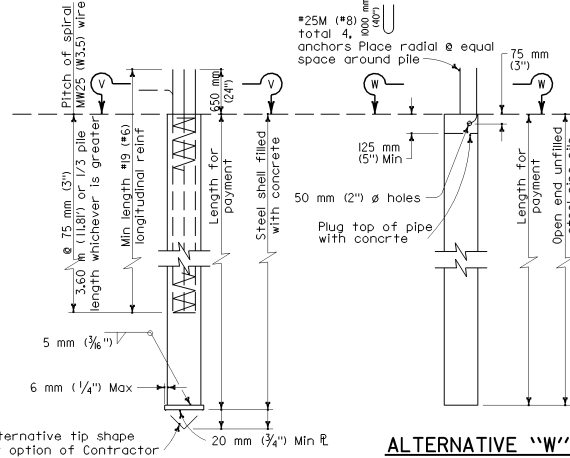
SECTION X-X

**To be in place when pile is cast

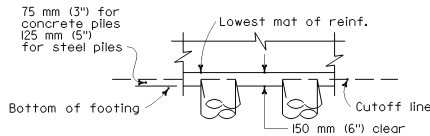


SECTION Y-Y

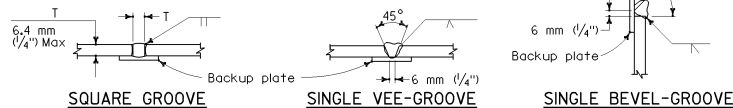
DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
<p><i>Daniel T. Adams</i> REGISTERED CIVIL ENGINEER</p> <p>July 1, 2002 PLANS APPROVAL DATE</p> <p>The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.</p> <p>Caltrans now has a web site. To get to the web site, go to http://www.dts.ca.gov</p>					



ALTERNATIVE "V"



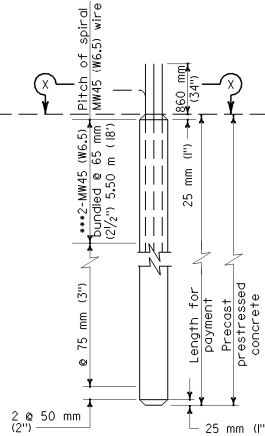
PILE EMBEDMENT



PILE WELDING DETAIL - BUTT JOINTS

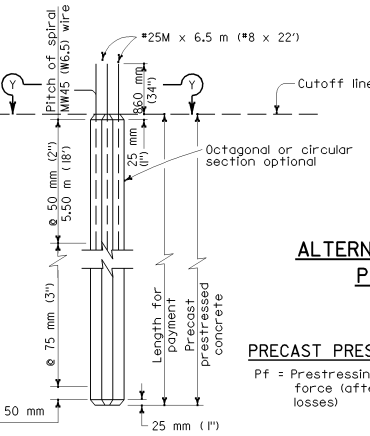
NOTES

1. Single Vee-Groove and Square Groove permitted for all positions.
2. Single Bevel-Groove permitted for horizontal joints only.

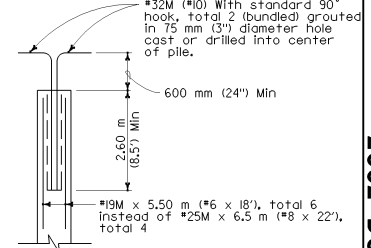


ALTERNATIVE "X"

... MW70 (W10.0) at 50 mm (2") may be substituted



ALTERNATIVE "Y"



ALTERNATIVE PILE ANCHOR FOR PRESTRESSED PILES

DESIGN NOTES

PRECAST PRESTRESSED PILES

Pf = Prestressing force (after losses) If section used is larger than the minimum section shown, then "Pf" shall provide 5 Mpa (700 psi) minimum.

Concrete Strength f'c @ 28 days = 42 MPa (6,000 psi) Alternative "X" 35 MPa (5,000 psi) Alternative "Y" f'c/e transfer = 28 MPa (4,000 psi)

REINFORCED CONCRETE

f'c = 28 MPa (4,000 psi)
fy = 420 MPa (60,000 psi)

STEEL PIPE PILE

Fy (Minimum yield strength) = 240 MPa (35,000 psi)
Fu (Minimum tensile strength) = 400 MPa (60,000 psi)

DESIGN CAPACITY

Class 400 (45)
Compression = 400 kilonewtons (45 ton) [Service state]
800 kilonewtons (90 ton) [Nominal axial resistance]

Tension = 400 kilonewtons (45 ton) [Nominal axial resistance]

Class 625 (70)
Compression = 625 kilonewtons (70 ton) [Service state]
1250 kilonewtons (140 ton) [Nominal axial resistance]

Tension = 625 kilonewtons (70 ton) [Nominal axial resistance]

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
PILE DETAILS

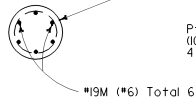
CLASS 400 (45) AND CLASS 625 (70)

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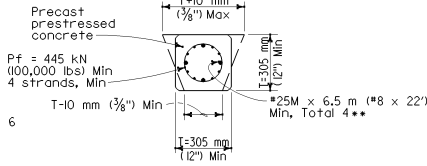
NO SCALE

B2-5

Class 400C = PP360 x 4.55
(Class 45C = PP14 x 0.179)
Class 625C = PP360 x 6.35
(Class 70C = PP14 x 0.250)



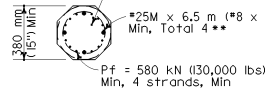
SECTION V-V
PP = Steel pipe pile



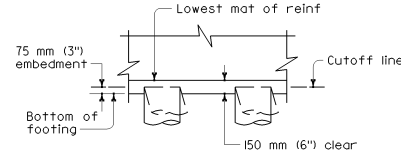
SECTION X-X

**To be in place when pile is cast

Precast prestressed concrete

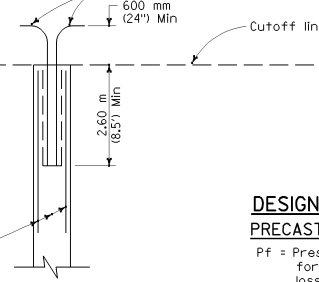


SECTION Y-Y



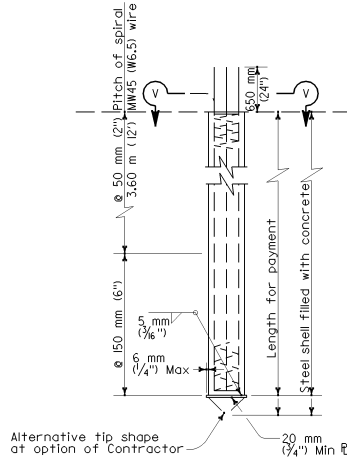
PILE EMBEDMENT

#32M (#10) With standard 90° hook, Total 2 (bundled) grouted in 75 mm (3") diameter hole cast or drilled into center of pile.

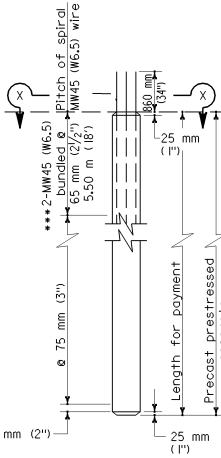


ALTERNATIVE PILE ANCHOR FOR PRESTRESSED PILES

#19M x 5.50 m (#6 x 18") Total 6 instead of #25M x 6.5 m (#8 x 22"), Total 4

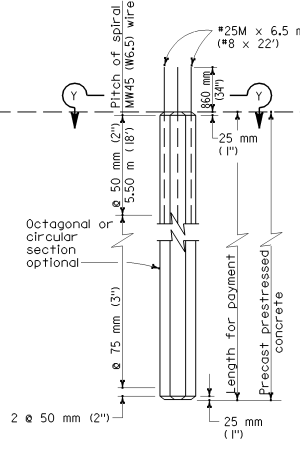


ALTERNATIVE "V"



ALTERNATIVE "X"

***MW70 (W110) at 50 mm (2") may be substituted



ALTERNATIVE "Y"

DESIGN NOTES

PRECAST PRESTRESSED PILES

Pf = Prestressing force (after section shown, then "Pf" shall provide losses) If section used is larger than the minimum 5 Mpa (700 psi) minimum.

Concrete Strength f'c @ 28 days = 42 MPa (6,000 psi) Alternative "X" 35 MPa (5,000 psi) Alternative "Y" f'cl @ transfer = 28 MPa (4,000 psi)

REINFORCED CONCRETE

f'c = 28 MPa (4,000 psi)
fy = 420 MPa (60,000 psi)

STEEL PIPE PILE

Fy (Minimum yield strength) = 240 MPa (35,000 psi)
Fu (Minimum tensile strength) = 400 MPa (60,000 psi)

DESIGN CAPACITY

Class 400 (45C)
Compression = 400 kilonewtons (45 ton) [Service state]
800 kilonewtons (90 ton) [Nominal axial resistance]

Tension = 400 kilonewtons (45 ton) [Nominal axial resistance]

Class 625 (70C)
Compression = 625 kilonewtons (70 ton) [Service state]
1250 kilonewtons (140 ton) [Nominal axial resistance]

Tension = 625 kilonewtons (70 ton) [Nominal axial resistance]

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PILE DETAILS

CLASS 400C (45C) AND CLASS 625C (70C)

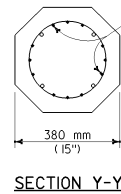
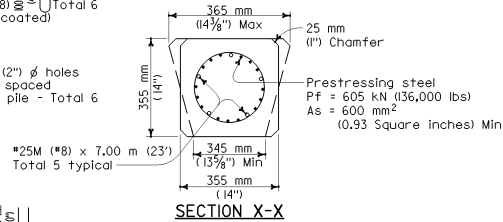
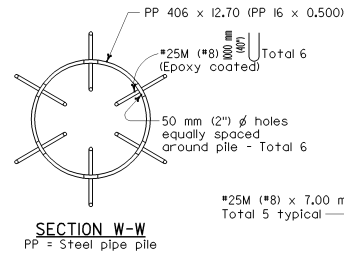
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NO SCALE

B2-6

NOTES

- Details are the same for both Class 400C (45C) and Class 625C (70C) piles unless noted otherwise.
- Pile reinforcement extending into a footing shall be hooked as required to provide clearance to top of footing. Piles shall be extended only in accordance with details shown elsewhere in these plans.
- Lapped splices in spiral pile reinforcement shall be lapped 80 wire diameters minimum. Spiral pile reinforcement at splices and at ends shall be terminated by a 135° hook with 150 mm (6") tall hooked around a longitudinal bar or strand.
- At the Contractor's option, alternative steel pipe with at least the diameter and wall thickness shown on these plans may be used. The diameter shall not exceed 460 mm (18").
- All concrete in piles shall contain not less than 450 kilograms of cement per cubic meter (752 pounds per cubic yard).
- A 50 mm (2") clearance to spiral reinforcement shall be maintained if section used is larger than the minimum section shown.
- Maximum cut-off length at the top of the Alternative "X" and Alternative "Y" piles is 3 m (10').
- For additional longitudinal reinforcement and prestressing for anchor piles and load test piles, see "Load Test Pile Details (2)", Standard Plan B2-10.



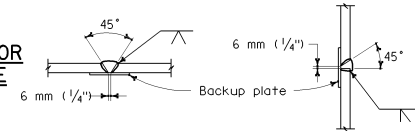
*32M (#10) with standard 90° hook, total 3 (bundled) grouted in 100 mm (4") diameter hole cast or drilled into center of pile

Cutoff line

Prestressing steel
Pf = 580 kN (130,000 lbs)
As = 600 mm²
(0.93 square inches) Min

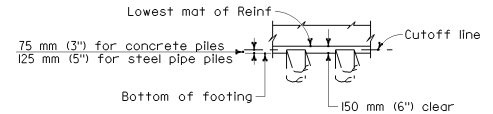
*25M (#8) x 6.00 m (19.68') total 5

ALTERNATIVE PILE ANCHOR FOR PRESTRESSED PILE



SINGLE VEE-GROOVE PILE WELDING DETAIL - BUTT JOINTS

Notes: 1. Single Vee-Groove permitted for all positions.
2. Single Bevel-Groove permitted for horizontal joints only.



PILE EMBEDMENT

DESIGN NOTES

DESIGN: BRIDGE DESIGN SPECIFICATIONS
(1983 AASHTO with Interims and Revisions by CALTRANS)

DESIGN CAPACITY: Compression = 900 kilonewtons (100 ton) [Service state]
Tension = 1800 kilonewtons (200 ton) [Nominal axial resistance]
= 900 kilonewtons (100 ton) [Nominal axial resistance]

REINFORCED CONCRETE: f'c = 28 MPa (4,000 psi)
fy = 420 MPa (60,000 psi)

PRECAST PRESTRESSED PILES: Pf = Prestress Force (After losses)
Concrete Strength f'c @ 28 days = 48 MPa (7,000 psi)
fcl @ transfer = 28 MPa (4,000 psi)

STEEL PIPE PILE: Fy (minimum yield strength) = 240 MPa (35,000 psi)
Fu (minimum tensile strength) = 400 MPa (58,000 psi)

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PILE DETAILS CLASS 900 (100) AND CLASS 900C (100C)

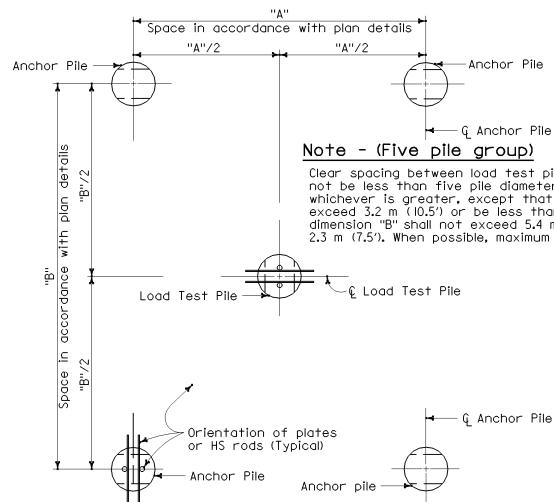
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NO SCALE

B2-8

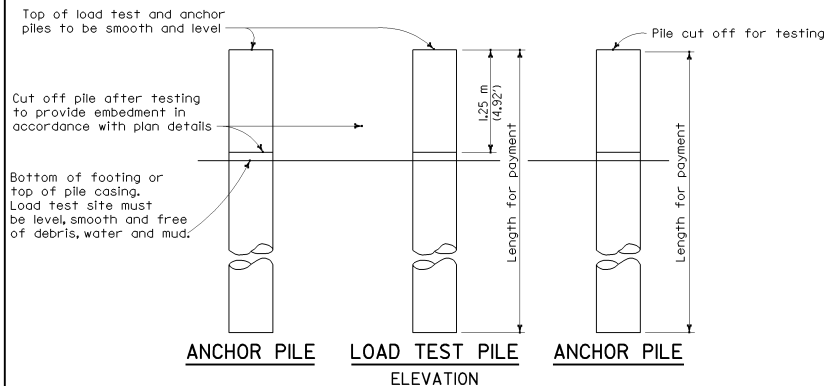
NOTES:

- Concrete in Class 900C (100C) Piles shall contain not less than 450 kilograms of cement per cubic meter (752 pounds per cubic yard).
- Pile reinforcement extending into footing shall be hooked as required to provide clearance to top of footing.
- Lapped splices in spiral pile reinforcement shall be lapped 80 wire diameters minimum. Spiral pile reinforcement at splices and at ends shall be terminated by a 135° hook with 150 mm (6") tail hooked around a longitudinal bar or strand.
- At the Contractor's option, alternative steel pipe with at least the diameter and wall thickness shown on these plans may be used. The diameter shall not exceed 460 mm (18").
- Alternative "W" piles shall not be used for CLASS 900C (100C) pile.
- Maximum cut-off length at the top of the Alternative "X" and Alternative "Y" piles is 3 m (10').



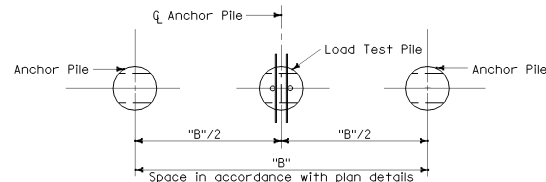
Note - (Five pile group)

Clear spacing between load test pile and anchor pile shall not be less than five pile diameters or two meters (6.6') whichever is greater, except that dimension "A" shall not exceed 3.2 m (10.5') or be less than 1.7 m (5.6') and dimension "B" shall not exceed 5.4 m (17.7') or less than 2.3 m (7.5'). When possible, maximum spacing is to be used.



FIVE - PILE LOAD TEST PILE GROUP

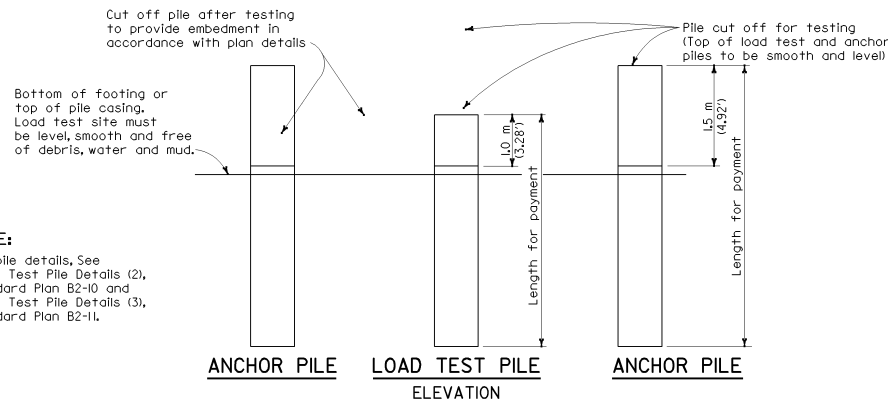
(FOR COMPRESSION - TENSION PILE LOAD TESTS)



Note - (Three pile group)

Clear spacing between load test pile and anchor pile shall not be less than five pile diameters or two meters (6.6') whichever is greater, except that dimension "B" shall not exceed 5.4 m (17.7') or be less than 2.0 m (6.6'). When possible, maximum spacing is to be used.

PLAN



THREE - PILE LOAD TEST PILE GROUP

(FOR TENSION PILE LOAD TESTS ONLY)

LOAD TEST PILE DETAILS (1)

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NO SCALE

B2-9

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
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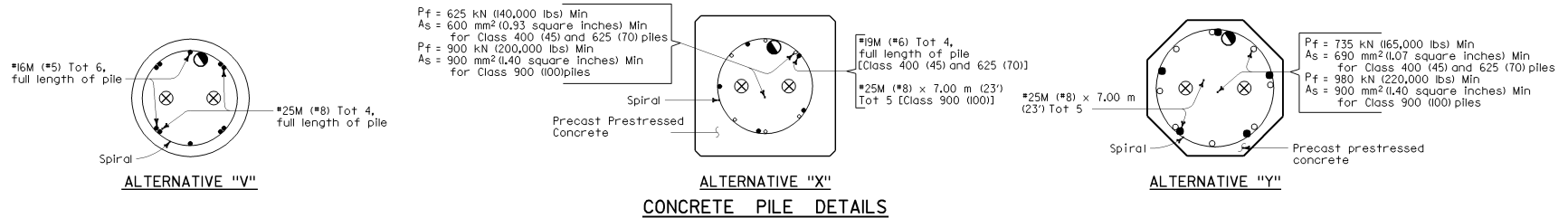
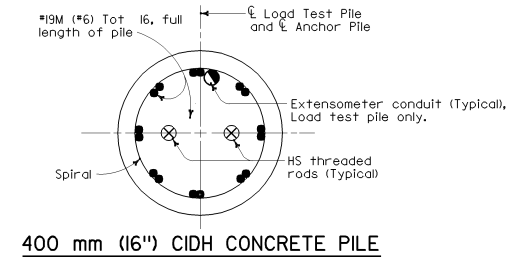
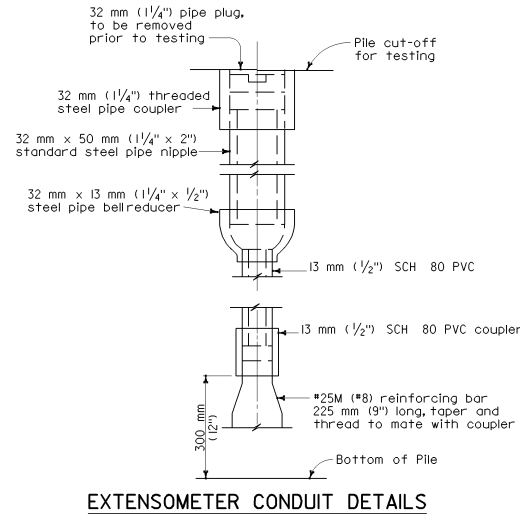
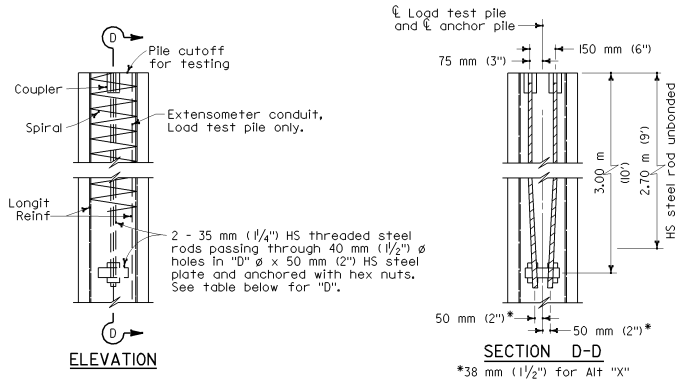
REGISTERED PROFESSIONAL ENGINEER

Daniel T. Adams

NO. C46418

EXPI. 6-30-03

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PILE TYPE	\"D\"	MAXIMUM TENSILE TEST FORCE PER PILE
Class 400 (45) & 625 (70) Alt \"V\", \"Y\"	175 mm (7\")	935 kilonewtons (210 kips)
Class 400 (45) & 625 (70) Alt \"X\"	150 mm (6\")	935 kilonewtons (210 kips)
Class 900 (100) Alt \"X\", \"Y\"	170 mm (6 3/4\")	1350 kilonewtons (300 kips)
CIDH	200 mm (8\")	1350 kilonewtons (300 kips)

NOTES:

- For details not shown, see applicable pile details shown elsewhere in the Project Plans.
- For the additional top 1.25 m (4.1') of pile for testing, the spiral reinforcement shall be the same size and placed at the same pitch as detailed for the top of piles shown elsewhere in the Project Plans.
- Details applicable for load test and anchor piles.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
LOAD TEST PILE DETAILS (2)

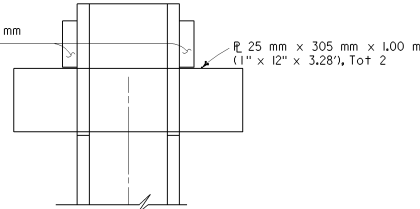
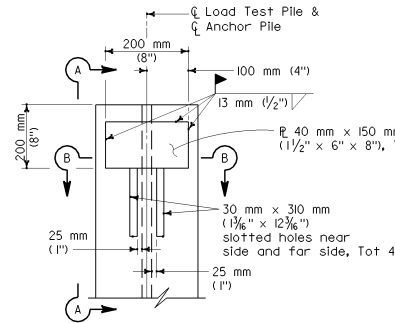
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NO SCALE

B2-10

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
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No. C46418
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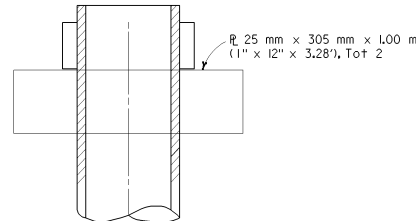
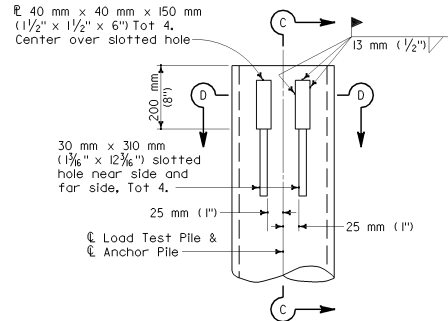
SECTION A-A

Maximum Tensile Test Force Per Pile : HP 250 (10) x 62 (42) = 800 kN (180 kips)
HP 250 (10) x 85 (57) = 1090 kN (245 kips)
HP 360 (14) x 132 (89) = 1350 kN (300 kips)

STEEL H-PILE DETAILS

NOTE:

Alignment of slots and 40 mm (1 1/2 inch) R's shall permit a R 25 mm x 305 mm x 1.00 m (1 inch x 12 inch x 3.28 inch) to pass through pile parallel to R web of pile and achieve a snug fit. Details applicable for load test and anchor piles. Slots to be cut after piles are driven.



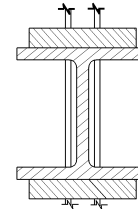
SECTION C-C

Maximum Tensile Test Force Per Pile : Class 400 (45) [PP 360 x 9.53 (14 x 0.375)] = 800 kN (80 kips)
Class 625 (70) [PP 360 x 11.12 (14 x 0.438)] = 1245 kN (280 kips)
Class 900 (100) [PP 406 x 12.70 (16 x 0.501)] = 1350 kN (300 kips)

ALTERNATIVE "W" STEEL PIPE - PILE DETAILS

NOTE:

Alignment of slots and 40 mm (1 1/2 inch) R's shall permit a R 25 mm x 305 mm x 1.00 m (1 inch x 12 inch x 3.28 inch) to pass through pile. Details applicable for load test and anchor piles. Slots to be cut after piles are driven.



SECTION B-B



SECTION D-D

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

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July 1, 2002
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STATE OF CALIFORNIA

LOAD TEST PILE DETAILS (3)

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NO SCALE

B2-11

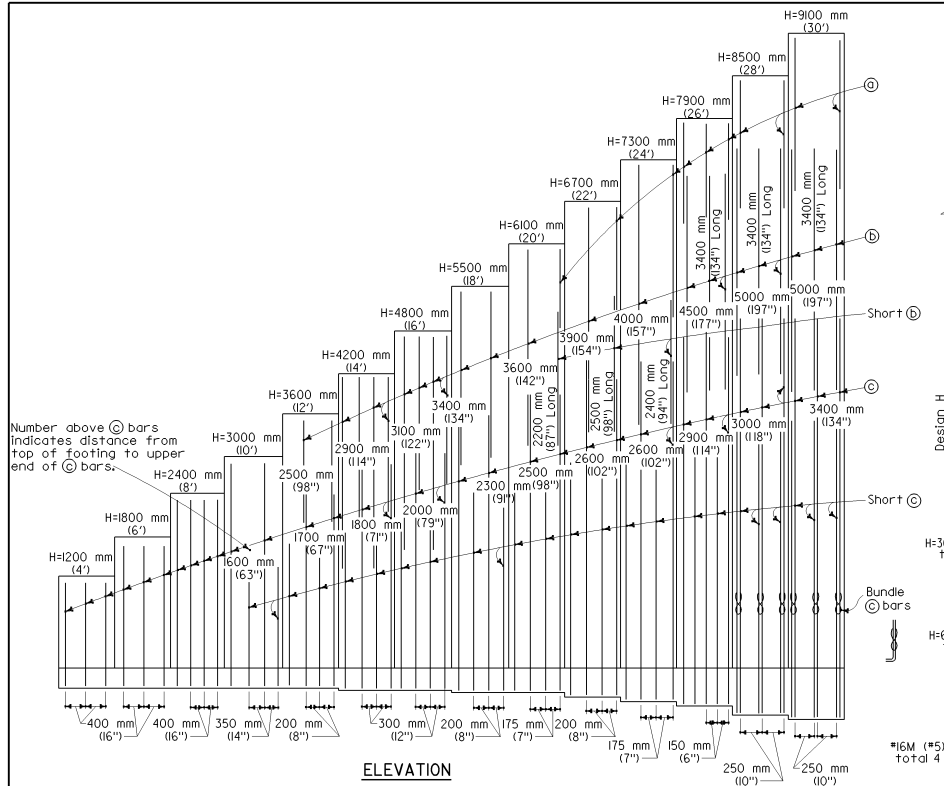
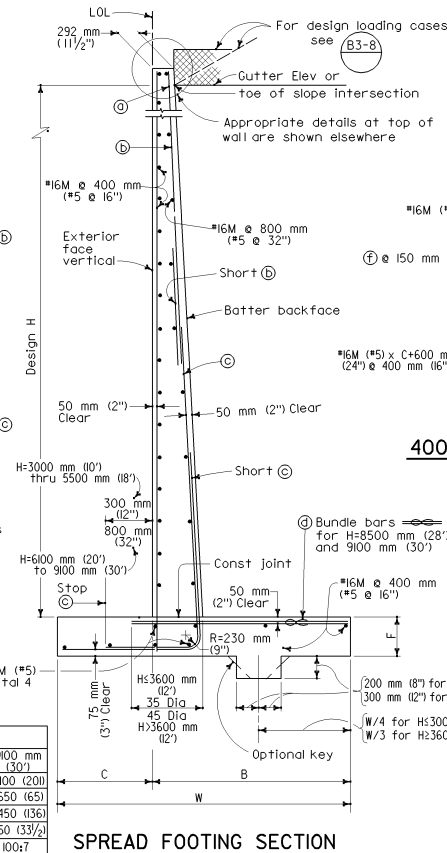


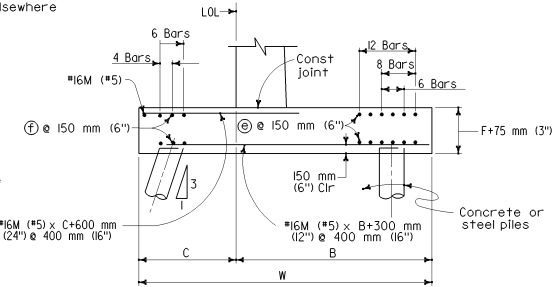
TABLE OF REINFORCING STEEL DIMENSIONS AND DATA

Design H	1200 mm (4')	1800 mm (6')	2400 mm (8')	3000 mm (10')	3600 mm (12')	4200 mm (14')	4800 mm (16')	5500 mm (18')	6000 mm (20')	6700 mm (22')	7300 mm (24')	7900 mm (26')	8500 mm (28')	9100 mm (30')
W mm (in)	1000 (39)	1300 (51)	1600 (63)	1900 (75)	2200 (87)	2450 (96)	2750 (108)	3050 (120)	3350 (132)	3700 (145)	4050 (159)	4350 (171)	4650 (183)	5100 (201)
C mm (in)	300 (12)	400 (16)	500 (20)	600 (24)	700 (28)	800 (31)	900 (35)	1000 (39)	1100 (43)	1200 (47)	1350 (53)	1450 (57)	1550 (61)	1650 (65)
B mm (in)	700 (27)	900 (35)	1100 (43)	1300 (51)	1500 (59)	1650 (65)	1850 (73)	2050 (80)	2250 (89)	2500 (98)	2700 (106)	2900 (114)	3100 (122)	3450 (136)
F mm (in)	400 (15 3/4)	400 (15 3/4)	400 (15 3/4)	400 (15 3/4)	400 (15 3/4)	450 (17 3/4)	450 (17 3/4)	450 (17 3/4)	450 (17 3/4)	450 (17 3/4)	550 (21 3/4)	650 (25 3/4)	750 (29 3/4)	850 (33 1/2)
Batter V:H	100:4	100:4	100:4	100:4	100:4	100:4	100:4	100:4	100:4	100:5	100:6	100:6	100:6	100:7
© bars #M (*) @ mm (in)	—	—	—	—	—	16 (5) @ 400 (16)	16 (5) @ 300 (12)	16 (5) @ 300 (12)	19 (6) @ 400 (16)	25 (8) @ 350 (14)	25 (8) @ 400 (16)	25 (8) @ 350 (14)	25 (8) @ 300 (12)	29 (9) @ 250 (10)
© bars #M (*) @ mm (in)	—	—	—	—	16 (5) @ 400 (16)	16 (5) @ 300 (12)	16 (5) @ 300 (12)	19 (6) @ 400 (16)	25 (8) @ 350 (14)	25 (8) @ 400 (16)	25 (8) @ 350 (14)	25 (8) @ 300 (12)	29 (9) @ 250 (10)	29 (9) @ 250 (10)
© bars #M (*) @ mm (in)	16 (5) @ 400 (16)	16 (5) @ 400 (16)	16 (5) @ 400 (16)	19 (6) @ 350 (14)	19 (6) @ 350 (14)	25 (8) @ 300 (12)	25 (8) @ 300 (12)	29 (9) @ 200 (8)	29 (9) @ 200 (8)	36 (14) @ 175 (7)	36 (14) @ 200 (8)	36 (14) @ 150 (6)	36 (14) @ 250 (10)	36 (14) @ 250 (10)
© bars #M (*) @ mm (in)	16 (5) @ 400 (16)	16 (5) @ 400 (16)	16 (5) @ 400 (16)	16 (5) @ 350 (14)	16 (5) @ 350 (14)	25 (8) @ 300 (12)	25 (8) @ 300 (12)	29 (9) @ 200 (8)	29 (9) @ 200 (8)	36 (14) @ 175 (7)	36 (14) @ 200 (8)	36 (14) @ 150 (6)	36 (14) @ 250 (10)	36 (14) @ 250 (10)
Total © bars #M (*)	6-19 (6)	6-19 (6)	6-19 (6)	12-19 (6)	12-19 (6)	12-19 (6)	12-19 (6)	8-19 (6)	8-19 (6)	8-19 (6)	6-19 (6)	6-19 (6)	6-19 (6)	6-19 (6)
Total © bars #M (*)	—	—	—	—	—	6-19 (6)	6-19 (6)	6-19 (6)	6-19 (6)	4-16 (5)	4-16 (5)	4-16 (5)	4-16 (5)	4-16 (5)
Loading Case I	Toe Pressure kPa (k/sf)	80 (1.7)	90 (1.9)	105 (2.2)	120 (2.5)	135 (2.8)	160 (3.3)	170 (3.5)	190 (4.0)	205 (4.3)	220 (4.6)	235 (4.9)	255 (5.3)	275 (5.7)
Loading Case II	Toe Pressure kPa (k/sf)	55 (1.2)	70 (1.5)	95 (2.0)	110 (2.3)	130 (2.7)	160 (3.3)	175 (3.7)	200 (4.2)	225 (4.7)	265 (5.5)	285 (6.0)	310 (6.5)	340 (7.1)
Loading Case III	Toe Pressure kPa (k/sf)	65 (1.4)	80 (1.7)	100 (2.0)	120 (2.5)	140 (2.9)	165 (3.4)	180 (3.8)	205 (4.3)	230 (4.8)	260 (5.4)	280 (5.8)	310 (6.3)	345 (7.5)

Ⓜ Denotes a bundle of 2 bars



DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
<p><i>Overcomer P. Mor</i> REGISTERED CIVIL ENGINEER</p> <p>July 1, 2002 PLANS APPROVAL DATE</p> <p>The State of California or its officers or agents shall not be responsible for the accuracy or completeness or electronic copies of this plan sheet.</p> <p>Caltrans now has a web site! To get to the web site, go to https://www.dot.ca.gov</p>					
<p>REGISTERED PROFESSIONAL ENGINEER</p> <p>Overcomer P. Mor</p> <p>No. C45803</p> <p>Exp. 12-31-06</p> <p>STATE OF CALIFORNIA</p>					



Reinforcement detailed is to be placed in addition to that shown for spread footing. All piles not shown, see Pile Layout on other sheets.

NOTES

- For details not shown and drainage notes see B3-8
- For wallstem joint details see B3-3 and B3-3-4
- For pile footing for design H=1200 mm (4') use same footing dimensions as for design H=1800 mm (6').

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**RETAINING WALL
TYPE 1**

**H=1200 mm THRU 9100 mm
(H=4' THRU 30')**

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NO SCALE

B3-1

NOTES

- For details not shown and drainage notes see (B3-8)
- For wall stem joint details, see (B0-3) 3-3 and (B0-3) 3-4
- At (c) and Short (c) bars:
 $H \leq 1800 \text{ mm (6')}$, no splices are allowed within 500 mm (20") above the top of footing.
 $H > 1800 \text{ mm (6')}$, no splices are allowed within $H/4$ above the top of footing.

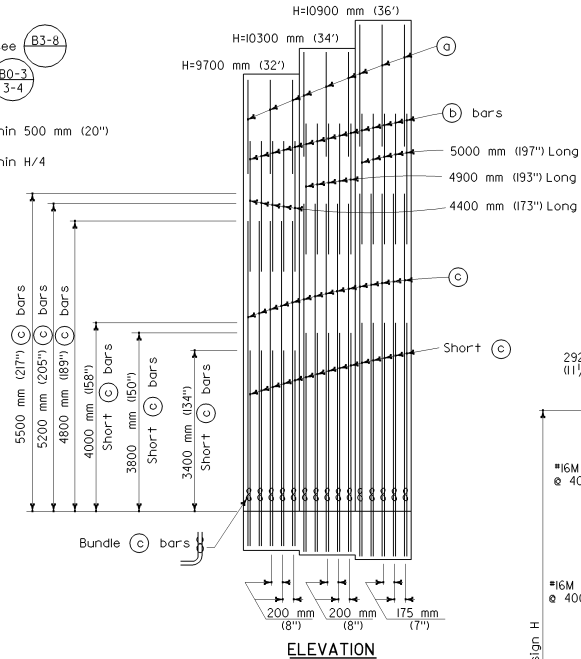
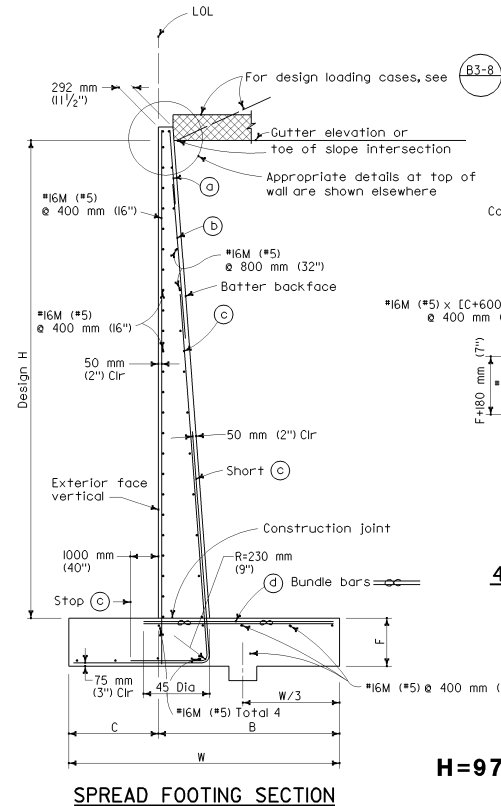


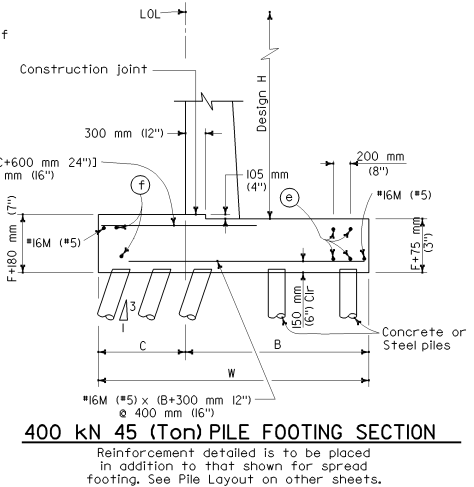
TABLE OF REINFORCING STEEL, DIMENSIONS AND DATA

Design H	9700 mm (32')	10300 mm (34')	10900 mm (36')
W	5600 mm (22'")	5900 mm (23'")	6200 mm (24'")
C	1800 mm (7'")	1900 mm (7'")	2000 mm (7'")
B	3800 mm (15'")	4000 mm (15'")	4200 mm (16'")
F Spread Footing	1000 mm (39 1/2'")	1100 mm (43 1/2'")	1200 mm (47 1/2'")
Batter	100:8	100:8	100:8
(a) bars	*19M (#6) ϕ 400 mm (16'")	*19M (#6) ϕ 400 mm (16'")	*19M (#6) ϕ 350 mm (14'")
(b) bars	*29M (#9) ϕ 200 mm (8'")	*29M (#9) ϕ 200 mm (8'")	*29M (#9) ϕ 175 (7'")
(c) bars	*36M (#11) ϕ 200 mm (8'")	*36M (#11) ϕ 200 mm (8'")	*36M (#11) ϕ 175 (7'")
(d) bars	*29M (#9) ϕ 200 mm (8'")	*29M (#9) ϕ 200 mm (8'")	*29M (#9) ϕ 175 (7'")
Total (e) bars	6-*19M (#6)	6-*19M (#6)	6-*19M (#6)
Total (f) bars	4-*16M (#5)	4-*16M (#5)	4-*16M (#5)
Loading Case I			
H Comp kN (kip)	110 (24.7)	125 (28.1)	140 (31.5)
V Comp kN (kip)	265 (59.6)	300 (67.4)	330 (74.1)
Toe Pr, kPa (k/sf)	300 (6.3)	325 (6.8)	350 (7.3)
Loading Case II			
H Comp kN (kip)	165 (37.1)	185 (41.6)	210 (47.2)
V Comp kN (kip)	365 (82.1)	410 (92.2)	455 (102.3)
Toe Pr, kPa (k/sf)	370 (7.7)	400 (8.4)	435 (9.1)
Loading Case III			
H Comp kN (kip)	130 (29.2)	145 (32.6)	160 (36.0)
V Comp kN (kip)	295 (66.3)	330 (74.1)	370 (83.2)
Toe Pr, kPa (k/sf)	380 (7.9)	400 (8.4)	425 (8.9)

∞ Denotes a bundle of 2 bars.



DIST	COUNTY	ROUTE	KILOMETER POST	SHEET TOTAL
				NO. SHEETS
Overcomey & Son REGISTERED CIVIL ENGINEER No. C45803 State of California July 1, 2002 PLANS APPROVAL DATE The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet. Caltrans now has a web site! To get to the web site, go to: https://www.dot.ca.gov				



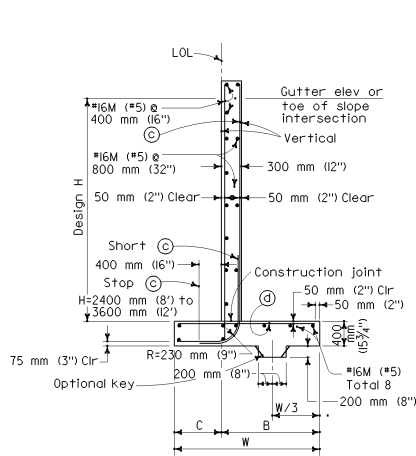
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
RETAINING WALL

TYPE 1
H=9700 mm THRU 10 900 mm
(H=32' THRU 36')

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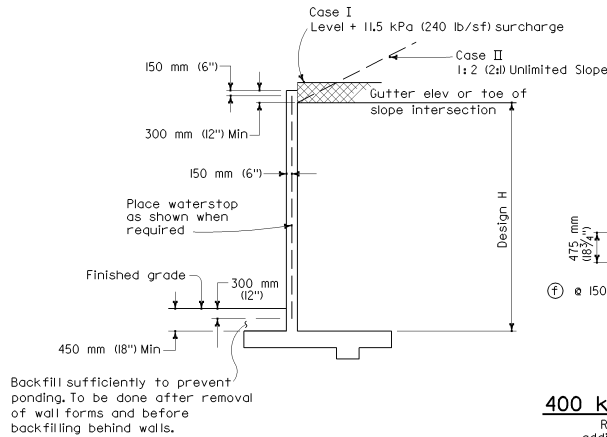
NO SCALE

B3-2

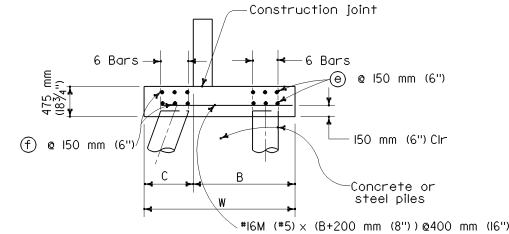


SPREAD FOOTING SECTION

Place concrete in toe, against undisturbed material, except as permitted by the Engineer.

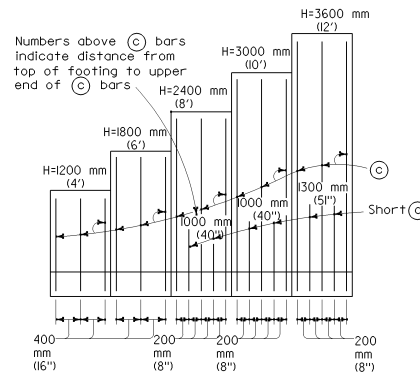


DESIGN



400 KN 45 TON PILE FOOTING SECTION

Reinforcement detailed is to be placed in addition to that shown for spread footing. All piles not shown, see Pile Layout on other sheets. For pile footing for Design H=1200 mm (4') use same footing dimensions as for Design H=1800 mm (6').



ELEVATION

NOTES

- Retaining Wall Type 1A designed for Design Loading Cases I and II only.
- For design notes, drainage notes and other details, See **B3-8**.
- For wall stem joint details, see **B0-3** and **B0-3**.
- At **(C)** and Short **(C)** bars:
H < 1800 mm (6'), no splices are allowed within 500 mm (20") above the top of footing.
H > 1800 mm (6'), no splices are allowed within H/4 above the top of footing.

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION RETAINING WALL TYPE 1A

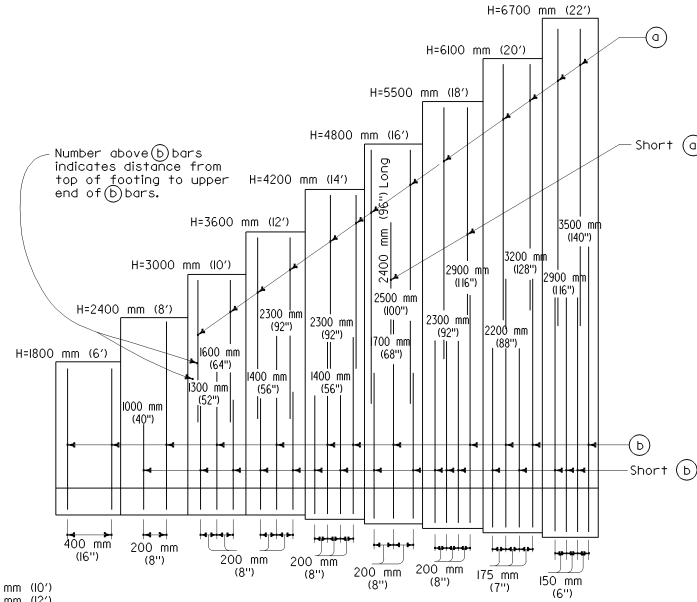
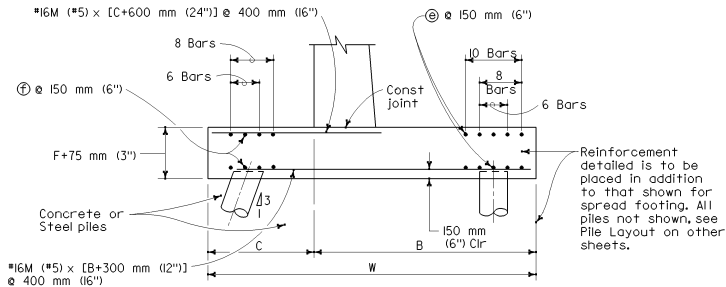
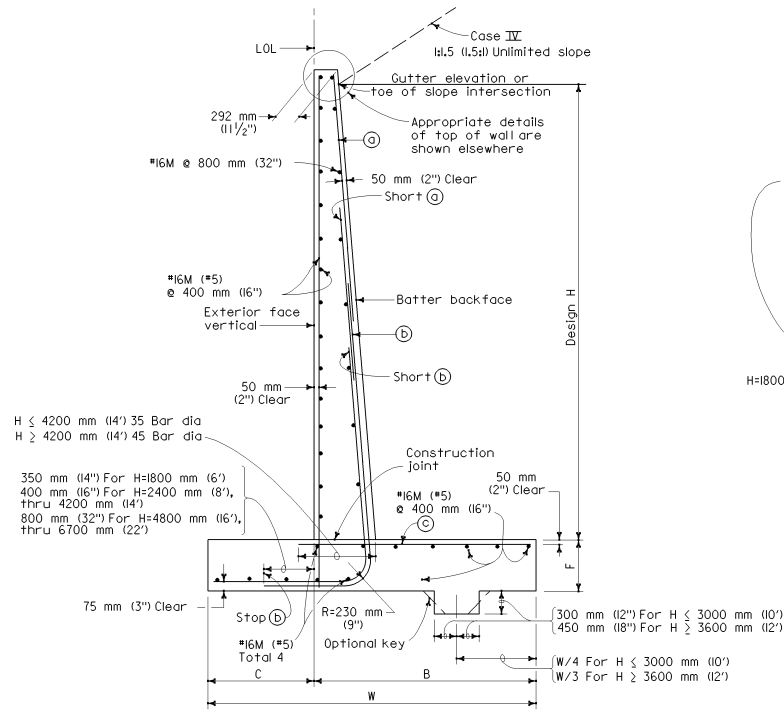
These "Standard Plans for Construction of Local Streets and Roads" contain units in two systems of measurement: International System of Units (SI or "metric") and United States Standard Measures shown in the parentheses (). The measurements expressed in the two systems are not necessarily equal or interchangeable. See the "Foreword" at the beginning of this publication.

NO SCALE

B3-3

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
<p>Overcomer, Y. Ror REGISTERED CIVIL ENGINEER</p> <p>July 1, 2002 PLANS APPROVAL DATE</p> <p>The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.</p> <p>Caltrans now has a web site! To go to the web site, go to: https://www.dot.ca.gov</p>					

TABLE OF REINFORCING STEEL, DIMENSIONS AND DATA						
Design H	1200 mm (4')	1800 mm (6')	2400 mm (8')	3000 mm (10')	3600 mm (12')	
W	1000 mm (39")	1300 mm (51")	1600 mm (63")	1900 mm (75")	2200 mm (87")	
C	300 mm (12")	400 mm (16")	500 mm (20")	600 mm (24")	700 mm (28")	
B	700 mm (27")	900 mm (35")	1100 mm (43")	1300 mm (51")	1500 mm (59")	
(C) bars	#16M (#5) @ 400 mm (16")	#16M (#5) @ 400 mm (16")	#16M (#5) @ 200 mm (8")	#19M (#6) @ 200 mm (8")	#25M (#8) @ 200 mm (8")	
(d) bars	#16M (#5) @ 400 mm (16")	#16M (#5) @ 400 mm (16")	#16M (#5) @ 400 mm (16")	#19M (#6) @ 200 mm (8")	#19M (#6) @ 200 mm (8")	
Total (e) bars	6-#19M (#6)	6-#19M (#6)	6-#19M (#6)	6-#25M (#8)	6-#25M (#8)	
Total (f) bars	—	—	—	6-#19M (#6)	6-#19M (#6)	
Case I-Toe Press. kPa (k/sf)	75 (1.5)	95 (2.0)	110 (2.3)	125 (2.6)	135 (2.8)	
Case II-Toe Press. kPa (k/sf)	50 (1.0)	70 (1.5)	90 (1.9)	110 (2.3)	130 (2.7)	



NOTES

- For design notes, drainage notes and other details, See **B3-8**.
- For wall stem joint details, see **B0-3 3-3** and **B0-3 3-4**.
- At **(a)** and Short **(b)** bars:
 $H \leq 1800 \text{ mm (6')}$, no splices are allowed within 500 mm (20") above the top of footing.
 $H > 1800 \text{ mm (6')}$, no splices are allowed within $H/4$ above the top of footing.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**RETAINING WALL
TYPE 2**

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NO SCALE

B3-4

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
<p><i>Overcomer, Y. Ror</i> REGISTERED CIVIL ENGINEER</p> <p>July 1, 2002 PLANS APPROVAL DATE</p> <p>The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.</p> <p>Caltrans now has a web site! To get to the web site, go to: https://www.dot.ca.gov</p>					

REGISTERED PROFESSIONAL ENGINEER

Overcomer, Y. Ror

No. C45803

Exp. 12-31-02

STATE OF CALIFORNIA

DIST

COUNTY

ROUTE

KILOMETER POST TOTAL PROJECT

SHEET NO.

TOTAL SHEETS

Overcomer
Y. Rior

REGISTERED CIVIL ENGINEER

July 1, 2002

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REGISTERED PROFESSIONAL ENGINEER

Overcomer
Y. Rior

No. C45803

Exp. 12-31-02

1111

STATE OF CALIFORNIA

TABLE OF REINFORCING STEEL, DIMENSIONS AND DATA									
Design H	1800 mm (6')	2400 mm (8')	3000 mm (10')	3600 mm (12')	4200 mm (14')	4800 mm (16')	5500 mm (18')	6100 mm (20')	6700 mm (22')
W	1200 mm (47")	1600 mm (63")	2000 mm (79")	2500 mm (99")	3000 mm (118")	3500 mm (138")	4000 mm (158")	4600 mm (181")	5400 mm (213")
C	400 mm (16")	500 mm (20")	550 mm (22")	650 mm (26")	750 mm (30")	850 mm (34")	950 mm (38")	1150 mm (45")	1350 mm (53")
B	800 mm (31")	1100 mm (43")	1450 mm (57")	1850 mm (73")	2250 mm (88")	2650 mm (104")	3050 mm (120")	3450 mm (136")	4050 mm (160")
F	400 mm (15 3/4")	400 mm (15 3/4")	400 mm (15 3/4")	400 mm (15 3/4")	450 mm (17 3/4")	550 mm (21 3/4")	650 mm (25 1/2")	750 mm (29 1/2")	850 mm (33 1/2")
Batter	100:4	100:4	100:4	100:4	100:4	100:4	100:5	100:6	100:7
⊖ bars			#16M (#5) ⌀400 mm (16")	#16M (#5) ⌀400 mm (16")	#19M (#6) ⌀400 mm (16")	#19M (#6) ⌀200 mm (8")	#25M (#8) ⌀400 mm (16")	#25M (#8) ⌀350 mm (14")	#25M (#8) ⌀300 mm (12")
⊙ bars	#16M (#5) ⌀400 mm (16")	#16M (#5) ⌀200 mm (8")	#19M (#6) ⌀200 mm (8")	#25M (#8) ⌀200 mm (8")	#29M (#9) ⌀200 mm (8")	#36M (#11) ⌀200 mm (8")	#36M (#11) ⌀200 mm (8")	#36M (#11) ⌀175 mm (7")	#36M (#11) ⌀150 mm (6")
⊗ bars	#16M (#5) ⌀400 mm (16")	#16M (#5) ⌀400 mm (16")	#19M (#6) ⌀400 mm (16")	#19M (#6) ⌀200 mm (8")	#19M (#6) ⌀200 mm (8")	#25M (#8) ⌀200 mm (8")	#25M (#8) ⌀200 mm (8")	#25M (#8) ⌀175 mm (7")	#25M (#8) ⌀150 mm (6")
Total ⊖ bars	6-#19M (#6)	6-#19M (#6)	8-#25M (#8)	8-#25M (#8)	8-#25M (#8)	8-#25M (#8)	10-#19M (#6)	10-#19M (#6)	10-#19M (#6)
Total ⊙ bars			8-#19M (#6)	8-#19M (#6)	8-#19M (#6)	8-#19M (#6)	6-#19M (#6)	6-#19M (#6)	6-#19M (#6)
Toe Press KPa (k/sf)	125 (2.6)	155 (3.2)	185 (3.9)	215 (4.5)	240 (5.0)	275 (5.7)	315 (6.6)	335 (7.0)	335 (7.0)

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**RETAINING WALL
TYPE 2**

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NO SCALE

B3-4A

THIS STANDARD PLAN B3-4A INCLUDES CHANGES THAT WERE INCORPORATED IN REVISED STANDARD PLAN RSP B3-4, DATED OCTOBER 26, 2000, AND ISSUED AS A PART OF ERRATUM NO. 99-1 FOR THE 1999 METRIC STANDARD PLANS.

2002 DUAL UNITS STD PLAN B3-4A

[Return to Table of Contents](#)

Toe Pressure kPa (k/sf)

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B3-5



No other splices are allowed except shown in the plans.



STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**COUNTERFORT
RETAINING WALL
TYPE 4**

B3-6


DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
					
July 1, 2002 PLANS APPROVAL DATE					
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TABLE FOR SPACING FOR Ⓟ, Ⓢ & Ⓣ BARS			
Top of wall	Ⓟ	Ⓢ	Ⓣ
600 mm (2')	400 mm (16")	400 mm (16")	
1200 mm (4')	400 mm (16")	400 mm (16")	
1800 mm (6')	400 mm (16")	400 mm (16")	400 mm (16")
2400 mm (8')	400 mm (16")	400 mm (16")	400 mm (16")
3000 mm (10')	400 mm (16")	400 mm (16")	400 mm (16")
3600 mm (12')	300 mm (12")	400 mm (16")	400 mm (16")
4200 mm (14')	300 mm (12")	400 mm (16")	400 mm (16")
4900 mm (16')	300 mm (12")	400 mm (16")	300 mm (12")
5500 mm (18')	300 mm (12")	400 mm (16")	300 mm (12")
6100 mm (20')	300 mm (12")	400 mm (16")	300 mm (12")
6700 mm (22')	300 mm (12")	400 mm (16")	300 mm (12")
7300 mm (24')	300 mm (12")	400 mm (16")	200 mm (8")
7900 mm (26')	300 mm (12")	400 mm (16")	200 mm (8")
8500 mm (28')	300 mm (12")	400 mm (16")	200 mm (8")
9100 mm (30')	300 mm (12")	400 mm (16")	200 mm (8")
Distance below top of wall			

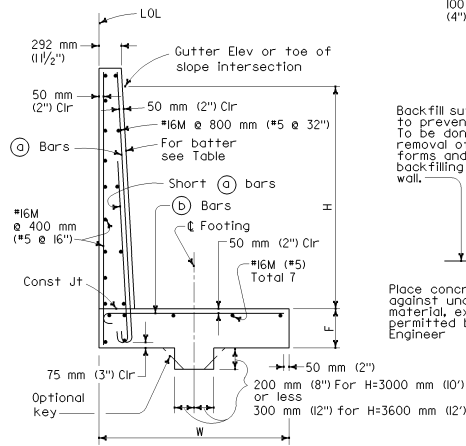
TABLE OF REINFORCING STEEL, DIMENSIONS AND DATA							
Design H	5500 (18')	6100 (20')	6700 (22')	7300 (24')	7900 (26')	8500 (28')	9100 (30')
W	3950 mm (15'")	4300 mm (16'")	4750 mm (18'")	5150 mm (20'")	5600 mm (22'")	5950 mm (23'")	6400 mm (25'")
F	550 mm (21 3/4")	650 mm (25 1/2")	650 mm (25 1/2")	650 mm (25 1/2")	700 mm (27 1/2")	700 mm (27 1/2")	800 mm (31 1/2")
(X) Bars, edge ctrfort	2-#29M (#9)	2-#29M (#9)	2-#29M (#9)	2-#36M (#11)	2-#36M (#11)	2-#36M (#11)	2-#36M (#11)
(X) Bars, length	6300 mm (248")	6900 mm (272")	7550 mm (297")	8200 mm (323")	8850 mm (348")	9550 mm (376")	10200 mm (402")
(X) Bars, edge ctrfort	4-#29M (#9)	4-#29M (#9)	4-#29M (#9)	4-#36M (#11)	4-#36M (#11)	4-#36M (#11)	4-#36M (#11)
(X) Bars, length	4000 mm (157")	4800 mm (189")	5400 mm (213")	6400 mm (252")	6700 mm (264")	6900 mm (272")	7900 mm (311")
(Z) Bars, edge ctrfort			2-#29M (#9)	2-#36M (#11)	2-#36M (#11)	2-#36M (#11)	2-#36M (#11)
(Z) Bars, length			3200 mm (126")	3700 mm (146")	4100 mm (161")	4200 mm (165")	5000 mm (197")
(b) Bars, back face wall	#16M (#5)			See Table for spacing			
(c) Bars, front face wall	#16M (#5)			See Table for spacing			
(d) Bars, wall face	#16M (#5) @ 200 mm (8")	#16M (#5) @ 175 mm (7")	#16M (#5) @ 175 mm (7")	#19M (#6) @ 175 mm (7")	#19M (#6) @ 150 mm (6")	#25M (#8) @ 200 mm (8")	#25M (#8) @ 200 mm (8")
(e) Stirrups ctrfort	#16M (#5)			See Table for spacing			
(f) Bars, toe	#16M (#5) @ 200 mm (8")	#16M (#5) @ 175 mm (7")	#16M (#5) @ 175 mm (7")	#16M (#5) @ 175 mm (7")	#16M (#5) @ 150 mm (6")	#19M (#6) @ 200 mm (8")	#19M (#6) @ 200 mm (8")
(f) Bars, length	1900 mm (75")	2200 mm (87")	2400 mm (94")	2600 mm (102")	2800 mm (110")	3000 mm (118")	3200 mm (126")
(k) Bars, ctrfort heel	#16M (#5) @ 300 mm (12")	#16M (#5) @ 300 mm (12")	#16M (#5) @ 300 mm (12")	#19M (#6) @ 300 mm (12")	#19M (#6) @ 300 mm (12")	#19M (#6) @ 300 mm (12")	#19M (#6) @ 300 mm (12")
(k) Bars, ctrfort heel	#16M (#5) @ 150 mm (6")	#16M (#5) @ 150 mm (6")	#16M (#5) @ 150 mm (6")	#19M (#6) @ 150 mm (6")	#19M (#6) @ 150 mm (6")	#19M (#6) @ 150 mm (6")	#19M (#6) @ 150 mm (6")
(m) Bars, top of heel	#19M (#6) @ 400 mm (16")	←					→
(n) Bars, top of heel	#19M (#6) @ 200 mm (8")	←					→
(n) Bars, bottom of heel	#16M (#5) @ 400 mm (16")	←					→
(h) Bars, bottom of heel	#16M (#5) @ 200 mm (8")	←					→
Toe Pressure, kPa (k/sf)	310 (6.5)	355 (7.4)	385 (8.0)	415 (8.7)	455 (9.5)	485 (10.1)	520 (10.9)

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**COUNTERFORT
RETAINING WALL
TYPE 4**

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NO SCALE

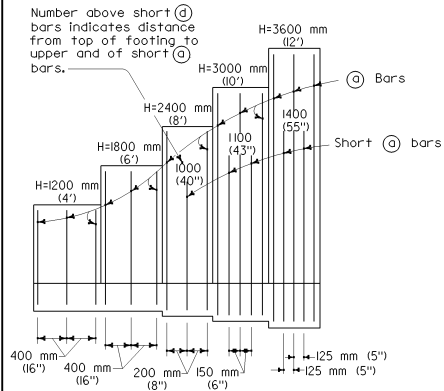
B3-6A



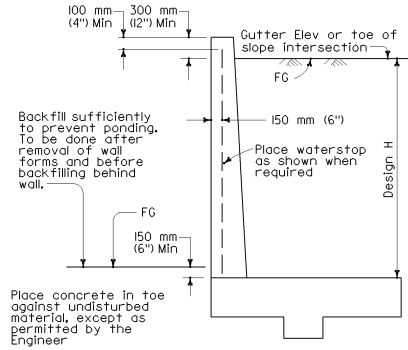
SPREAD FOOTING SECTION

NOTE

At (a) and Short (a) bars:
 If $H \leq 1800 \text{ mm (6')}$, no splices are allowed within 500 mm (20") above the top of footing.
 If $H > 1800 \text{ mm (6')}$, no splices are allowed within $H/4$ above the top of footing.

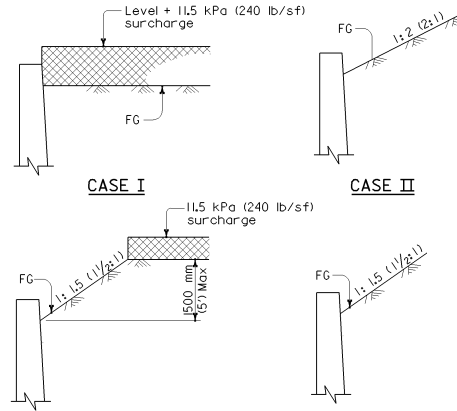


ELEVATION



DESIGN

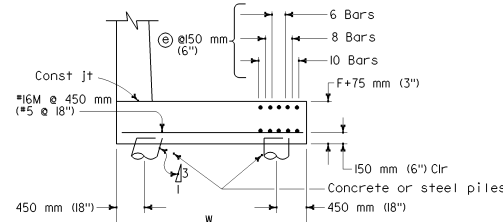
For drainage notes and other details, see B3-8



CASE III DETAIL OF DESIGN LOADING CASES

Case I: Level +11.5 kPa (240 lb/sf) surcharge
 Case II: 1:1.2 Unlimited slope
 Case III: 1:1.5 (1 1/2:1) Limited slope (1500 mm (5') max height)
 Case IV: 1:1.5 (1 1/2:1) Unlimited slope

TABLE OF REINFORCING STEEL, DIMENSIONS AND DATA					
Design H	1200 mm (4')	1800 mm (6')	2400 mm (8')	3000 mm (10')	3600 mm (12')
W	1250 mm (50")	1550 mm (61")	2000 mm (79")	2450 mm (96")	2900 mm (114")
F Spread Ftg	400 mm (15 3/4")	400 mm (15 3/4")	450 mm (17 3/4")	450 mm (17 3/4")	550 mm (21 3/4")
Batter	None	None	None	100:3	100:6
Short (a) Bars #M (# in)	16 # 400 (5 # 16)	16 # 400 (5 # 16)	16 # 400 (5 # 16)	16 # 300 (5 # 12)	16 # 250 (5 # 10)
Short (a) Bars #M (# in)	None	None	16 # 400 (5 # 16)	16 # 300 (5 # 12)	16 # 250 (5 # 10)
(b) Bars #M (# in)	16 # 400 (5 # 16)	16 # 400 (5 # 16)	16 # 200 (5 # 8)	16 # 150 (5 # 6)	16 # 125 (5 # 5)
Total (e) Bars	8-#19M (#6)	8-#19M (#6)	10-#19M (#6)	8-#19M (#6)	6-#19M (#6)
Case I kPa (k/sf)	80 (1.6)	105 (2.2)	120 (2.5)	145 (3.0)	170 (3.5)
Case II kPa (k/sf)	75 (1.5)	100 (2.1)	130 (2.7)	165 (3.4)	195 (4.1)
Case III kPa (k/sf)	80 (1.6)	110 (2.3)	140 (2.9)	185 (3.8)	210 (4.4)
Case IV kPa (k/sf)	95 (2.0)	155 (3.2)	200 (4.2)	255 (5.3)	310 (6.5)



400 kN (45 Ton) PILE FOOTING SECTION

NOTES

Design Conditions:

Design H may be exceeded by 150 mm (6") before going to the next size. Special footing design is required where foundation material is incapable of supporting toe pressure loads listed in table.

Design Data:

$f_c = 10 \text{ MPa (1,450 psi)}$ $f_y = 25 \text{ MPa (3,600 psi)}$ $f_s = 168 \text{ MPa (24,000 psi)}$ $n = 10$ earth = 19 kN/m^3 (120 lb/cf)
 Case I - Wall design for equivalent fluid pressure = 4.2 and 5.6 kPa/m (27 and 36 lb/sf/ft)
 Case II, III, IV - Wall design is based on Rankine's formula with $\phi = 33^\circ 42'$.

MAX PILE SPACING FOR 400 kN (45 Tons) PILES

Design H	Front Row	Back Row
	#3 Batter	Vertical
1200 mm (4')	5400 mm (18')	5400 mm (18')
1800 mm (6')	3600 mm (12')	5400 mm (18')
2400 mm (8')	2700 mm (9')	5400 mm (18')
3000 mm (10')	1800 mm (6')	3600 mm (12')
3600 mm (12')	1200 mm (4')	2400 mm (8')

For actual spacing, see Wall Layout.

Pile layout does not apply to Case IV conditions.

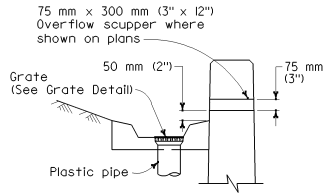
STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION RETAINING WALL TYPE 5

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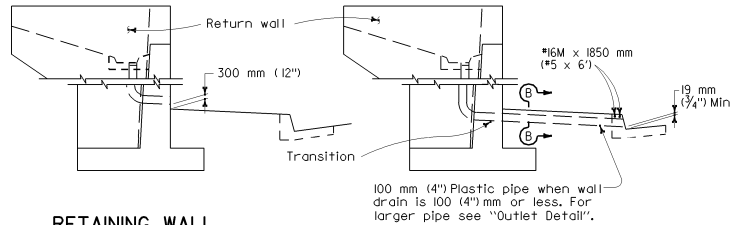
NO SCALE

B3-7

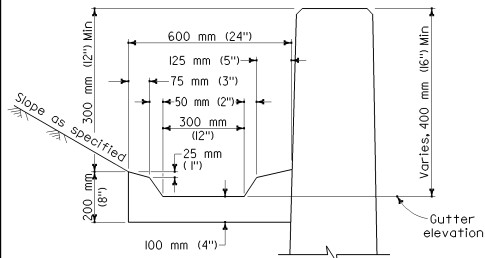




WALL DRAIN DETAIL



**RETAINING WALL,
FACE OF WALL OUTLET**

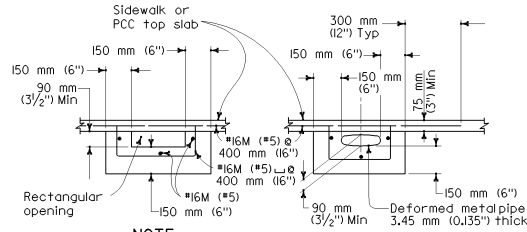


TYPICAL GUTTER DETAIL



GRATE DETAIL

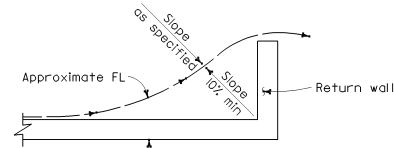
Sizes to fit standard hubs



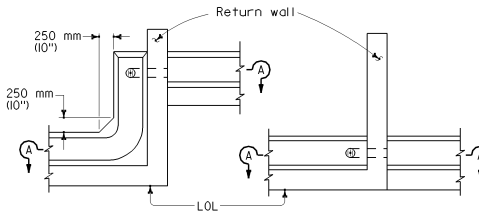
NOTE

Area of opening to be not less than that of pipe from wall/gutter. Make opening transition in wall. Edge opening in curb face to 19 mm (3/4\") minimum radius.

OUTLET DETAIL - SECTION B-B



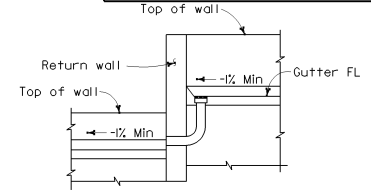
**WALL DRAINAGE
WHERE GUTTER NOT REQUIRED**



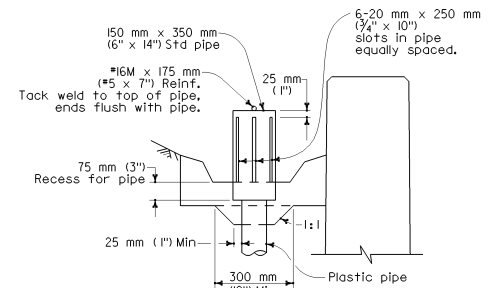
PLAN-OFFSET WALL

PLAN-CONTINUOUS WALL

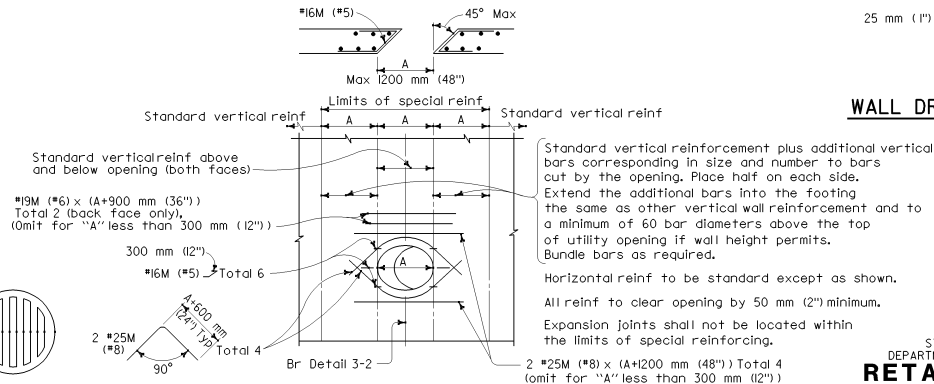
DRAIN THROUGH RETURN WALL



SECTION A-A



WALL DRAIN WITH PIPE DOME



RETAINING WALL UTILITY OPENING

Max size of opening (A) = 1200 mm (48\")

To be used in conjunction with sheet **B3-B**

**STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
RETAINING WALL
DETAILS NO. 2**

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NO SCALE

B3-9

DIST.	COUNTY	ROUTE	KILOMETER TOTAL PROJECT	POST NO.	SHEET NO.	TOTAL SHEETS
<p><i>Overcomer, Y. Ror</i> REGISTERED CIVIL ENGINEER</p> <p>July 1, 2002 PLANS APPROVAL DATE</p> <p>The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.</p> <p>Caltrans now has a web site! To get to the web site, go to: https://www.dot.ca.gov</p>						

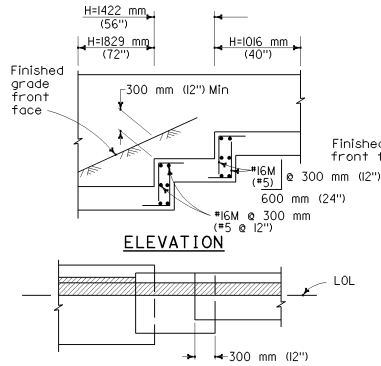
REGISTERED PROFESSIONAL ENGINEER

Overcomer, Y. Ror

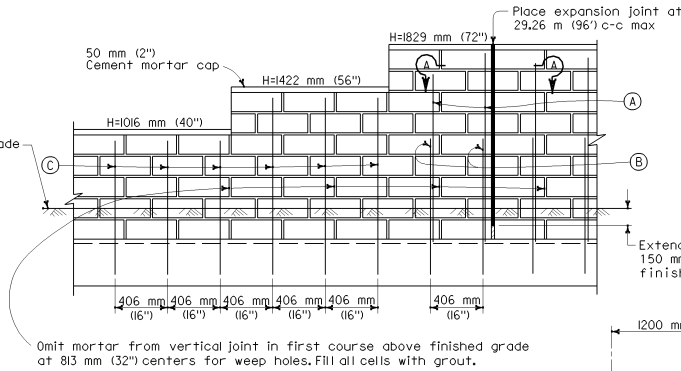
No. C45803

Exp. 12-31-02

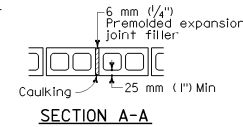
STATE OF CALIFORNIA



**PLAN
FOOTING STEP DETAILS**



ELEVATION - MASONRY CONSTRUCTION



SECTION A-A

DESIGN DATA

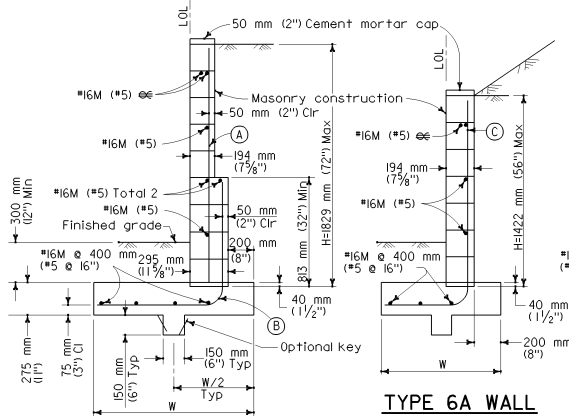
Masonry: $f_m = 3.5$ MPa (500 psi) $f_m = 10.5$ MPa (1,500 psi)
 $f_s = 168$ MPa (24,000 psi) $n = 20$

Reinforced Concrete: $f_c = 10$ MPa (1,450 psi) $f_c = 25$ MPa (3,600 psi)
 $f_s = 168$ MPa (24,000 psi) $n = 10$

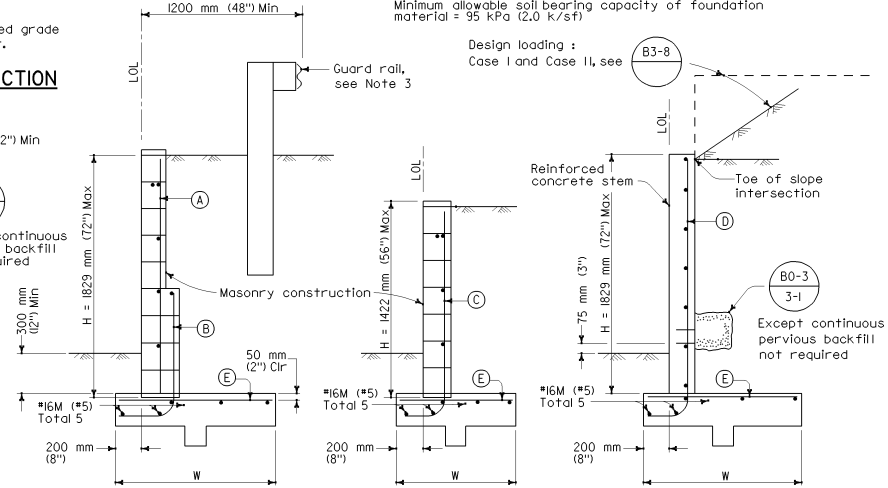
Earth = 19 kN/m^3 (120 lb/cf)

Minimum allowable soil bearing capacity of foundation material = 95 kPa (2.0 k/sf)

Design loading :
 Case I and Case II, see B3-8



TYPE 6A WALL



TYPE 6B WALL

NOTES

- For details not shown at "6B", see "6A".
- Type 6 retaining wall shall be limited to use for walls of Design H of 1829 mm (72") or less.
- Where traffic is adjacent to the top of wall, guard rails should be set back from the top front face of wall at least 1200 mm (4').
- Unless otherwise stipulated, the contractor will have the option of constructing the Type 6 walls of either masonry or reinforced concrete.
- For reinforced concrete wallstem joint details, See (B0-3) and (B0-3).
- No splices are allowed on (A), (B) and (C) bars.
- At (D) bar, no splices are allowed within 500 mm (20") above the top of footing.

Type	Design H mm (in)	1016 (40)	1219 (48)	1422 (56)	1626 (64)	1829 (72)
6A	W mm (in)	1000 (39)	1100 (43)	1200 (47)	1300 (51)	1400 (55)
6A	(*) M # mm (in)					
6A	(*) M # mm (in)					
6A	(*) M # mm (in)					
6A	(*) M # mm (in)					
6A	(*) M # mm (in)					
6A	(*) M # mm (in)					
6A	(*) M # mm (in)					
6A	(*) M # mm (in)					
6A	(*) M # mm (in)					

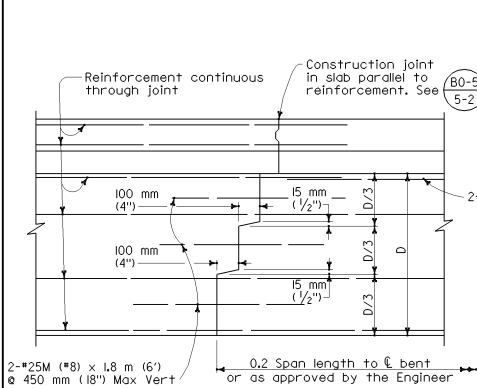
Type	Design H mm (in)	1016 (40)	1219 (48)	1422 (56)	1626 (64)	1829 (72)
6B	W mm (in)	850 (33)	950 (37)	1050 (41)	1150 (45)	1250 (49)
6B	(*) M # mm (in)					
6B	(*) M # mm (in)					
6B	(*) M # mm (in)					
6B	(*) M # mm (in)					
6B	(*) M # mm (in)					
6B	(*) M # mm (in)					
6B	(*) M # mm (in)					
6B	(*) M # mm (in)					
6B	(*) M # mm (in)					

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION **RETAINING WALL TYPE 6 1829 mm (6') MAXIMUM**

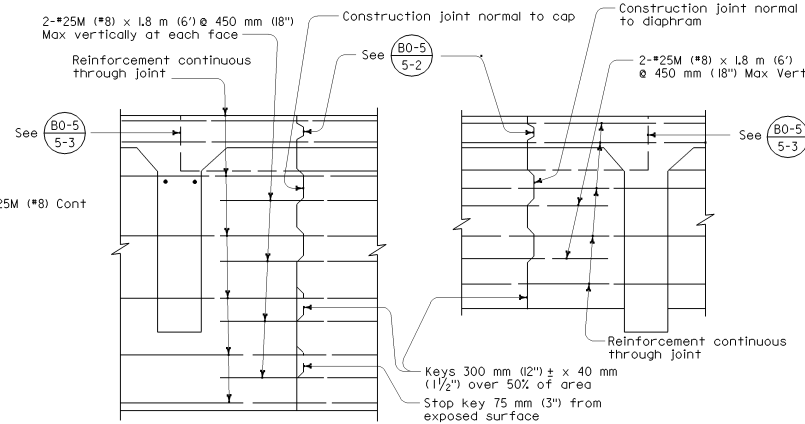
These "Standard Plans for Construction of Local Streets and Roads" contain units in two systems of measurement: International System of Units (SI or "metric") and United States Standard Measures shown in the parentheses ('). The measurements expressed in the two systems are not necessarily equal or interchangeable. See the "Foreword" at the beginning of this publication.

NO SCALE

B3-11



DETAIL J-3
TRANSVERSE GIRDER CONSTRUCTION JOINTS

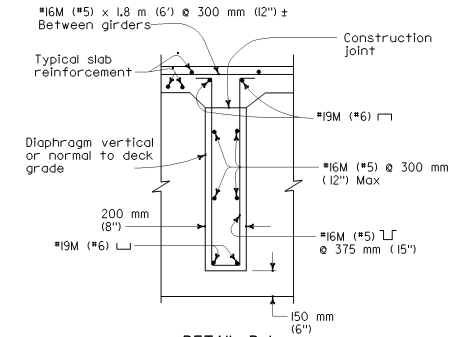


BENT CAP
DETAIL J-4
LONGITUDINAL CONSTRUCTION JOINTS

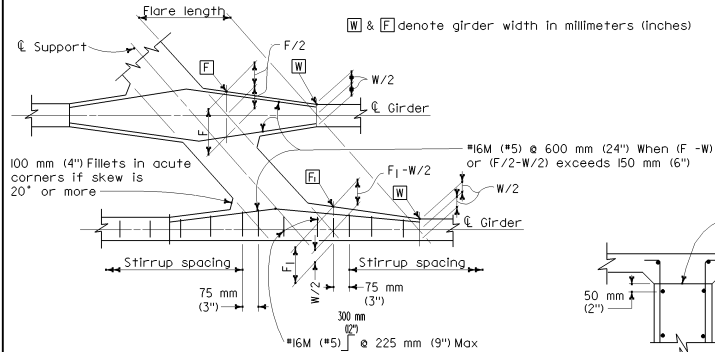
DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER
Madhesh
 July 1, 2002
 PLANS APPROVAL DATE
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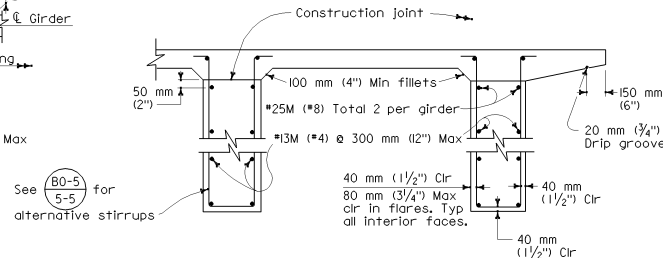
PROFESSIONAL ENGINEER
 Madhesh
 No. C11118
 Exp. 9-30-05
 CIVIL
 STATE OF CALIFORNIA



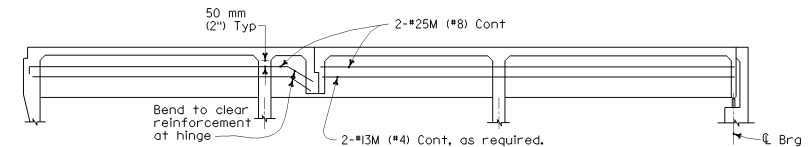
DETAIL D-1
INTERMEDIATE DIAPHRAGM SECTION



DETAIL S-3
TYPICAL GIRDER FLARE AND STIRRUP SPACING DIAGRAM



DETAIL T-1
TYPICAL T-BEAM DETAILS



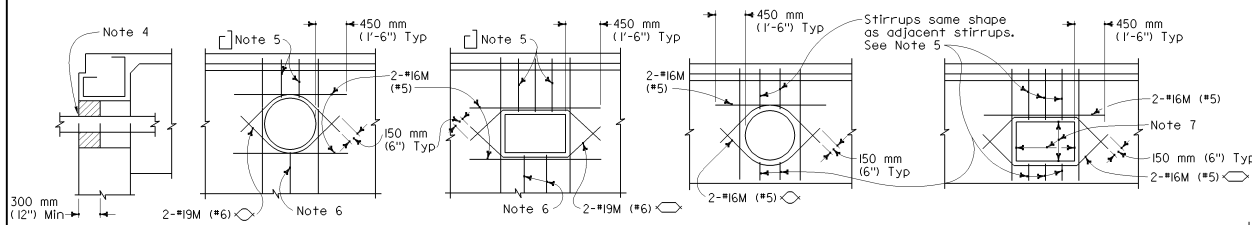
DETAIL J-1
GIRDER WEB REINFORCEMENT

STATE OF CALIFORNIA
 DEPARTMENT OF TRANSPORTATION
T-BEAM DETAILS

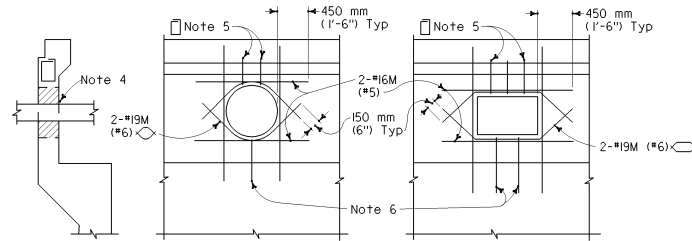
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NO SCALE

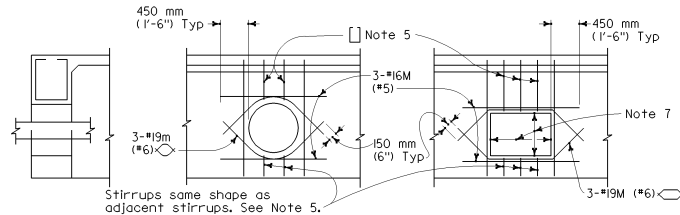
B6-1



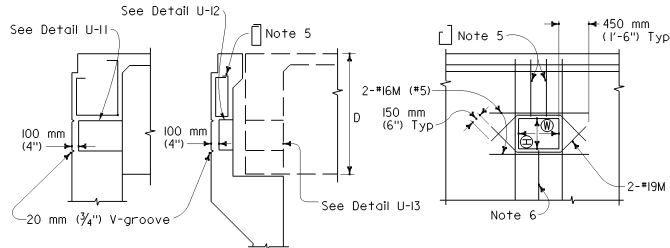
DETAIL U-11

DETAIL U-15
INTERMEDIATE DIAPHRAGMS

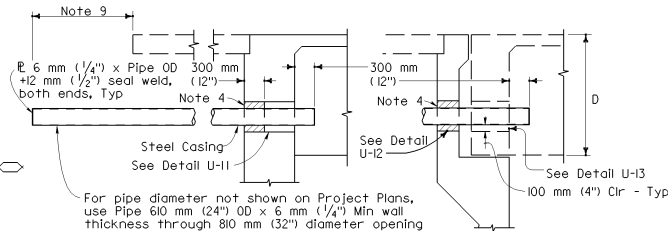
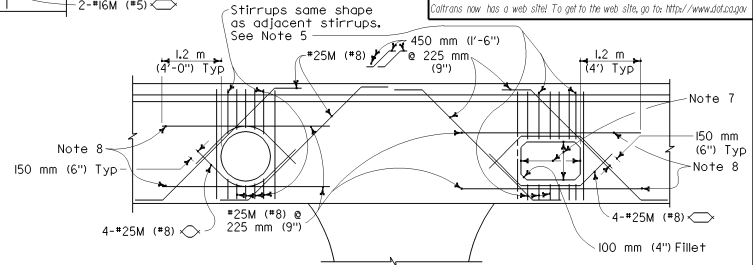
DETAIL U-12



DETAIL U-13

DETAIL U-14
ABUTMENT DIAPHRAGMS

For future utility opening dimensions not shown on Project Plans, use:
 (H) = $\frac{1}{3}$ D or 375 mm (15") minimum, whichever is greater.
 (W) = $\frac{1}{3}$ D or 375 mm (15") minimum, whichever is greater.

DETAIL U-16
ABUTMENT DIAPHRAGMSDETAIL U-17
BENT CAPS

Near or between columns

NOTES:

- The exact location, elevation, size and direction of openings shall be in accordance with the Project Plans and as directed by the Engineer.
- Girders not shown. See Project Plans.
- All reinforcement details to be placed in addition to reinforcement shown on Project Plans.
- Seal utilities at abutments with concrete or mortar, after tightly wrapping utility with 2 layers of 7 kg (15 lbs) building paper.
- Reinforcement to be same bar size, and $\frac{2}{3}$ the spacing of adjacent reinforcement shown on Project Plans.
- Reinforcement to be same bar size and shape as adjacent reinforcement shown on Project Plans.
- For future utility opening dimensions, See Project Plans and Detail U-14.
- When there is insufficient space to place reinforcement as shown, hook reinforcement into exterior girder.
- Unless otherwise shown on Project Plans, casing shall extend to the greater of 1.5 m (5') beyond the end of the approach slab, 1.5 m (5') beyond the end of the adjacent wingwall 6 m (20') beyond the back of the abutment.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**UTILITY OPENINGS
T-BEAM**

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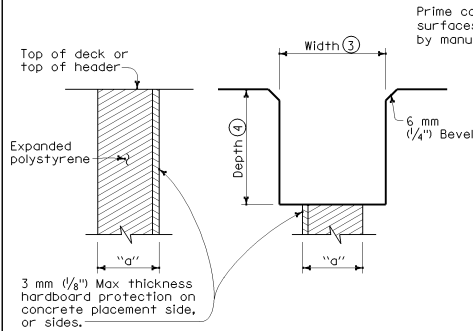
NO SCALE

B6-10

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

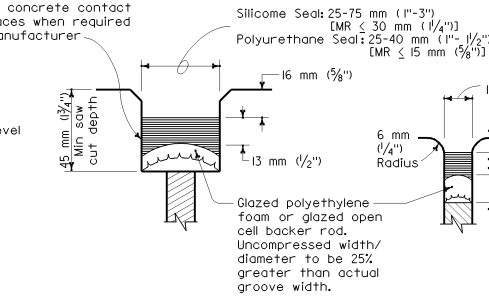
REGISTERED CIVIL ENGINEER
 July 1, 2002
 PLANS APPROVAL DATE
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REGISTERED PROFESSIONAL ENGINEER
 Madhresh Bhagvenderachar
 No. C21118
 Exp. 9-30-05
 STATE OF CALIFORNIA



FOAMING DETAIL

SAWCUT DETAIL

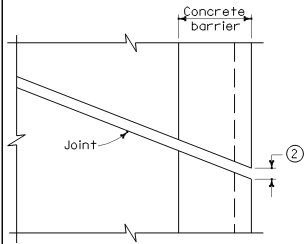


TYPE A SEAL

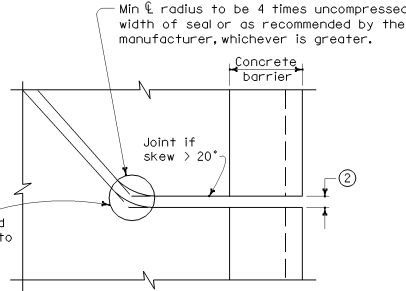
TYPE AL SEAL

Movement rating: Polyurethane = 15 mm (5/8") Max
Silicone = 30 mm (1 1/4") Max

Longitudinal joints only

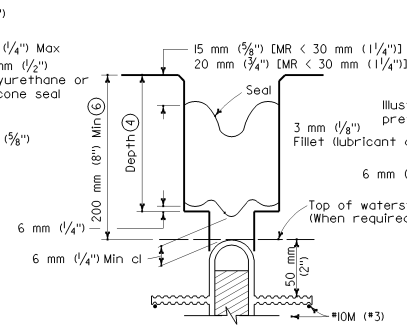
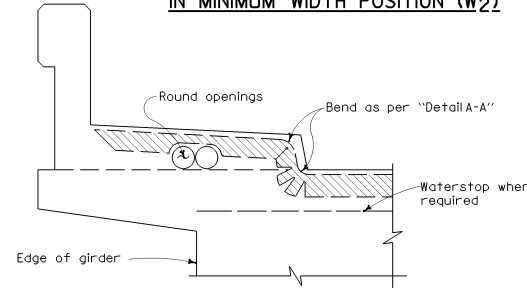


PLAN OF JOINT

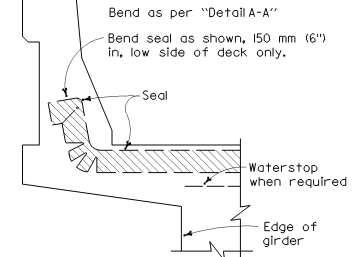


PLAN OF ANGLED JOINT

In lieu of saw cutting, this area may be blocked out and reconstructed to match saw cutting on both sides.

TYPE B JOINT SEAL
IN MINIMUM WIDTH POSITION (W2)TYPE B SEAL
Movement rating > 15 mm (5/8")

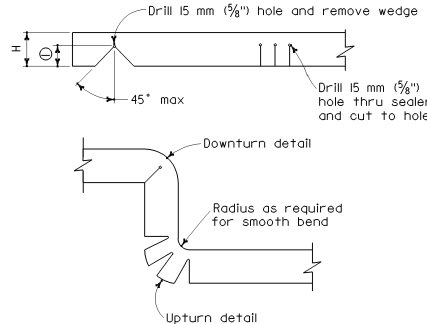
CONCRETE BARRIER AND SIDEWALK



CONCRETE BARRIER

DIMENSIONS "a" OF JOINT REQUIRED

Movement Rating (MR) (5)	Bridge Type	"a" Dimension Deck Concrete Placed		
		Winter	Fall-Spring	Summer
50 mm (2")	All except CIP/PS	40 mm (1 1/2")	30 mm (1 1/4")	20 mm (3/4")
	CIP/PS	30 mm (1 1/4")	25 mm (1")	15 mm (5/8")
40 mm (1 1/2")	All except CIP/PS	30 mm (1 1/4")	25 mm (1")	15 mm (5/8")
	CIP/PS	25 mm (1")	20 mm (3/4")	15 mm (5/8")
30 mm (1 1/4")	All except CIP/PS	25 mm (1")	20 mm (3/4")	15 mm (5/8")
	CIP/PS	20 mm (3/4")	15 mm (5/8")	15 mm (5/8")
15 mm (5/8")	All except CIP/PS	20 mm (3/4")	20 mm (3/4")	15 mm (5/8")
	CIP/PS	15 mm (5/8")	15 mm (5/8")	15 mm (5/8")



DETAIL A-A

NOTES:

- Make smooth cuts from the bottom of seal to 40 mm (1 1/2") clear of top leaving at least one complete cell between the top of the cut and top of the seal. When necessary, cut back of seal to clear conduit and round openings.
- Opening in barrier to match width of sawn deck joint.
- Sawcut groove widths shall be as ordered by the Engineer.
- Depth of sawcut: Type A - Depth to be shown above.
Type B - Depth to be equal to or greater than the depth of seal measured along the contact surface, when compressed to minimum width position (W2) plus dimensions shown above.
- MR (movement rating) as shown on other detail plans.
- Other depths must be approved by the Engineer.

JOINT SEALS DETAILS

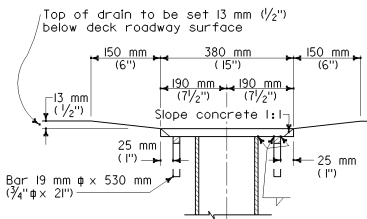
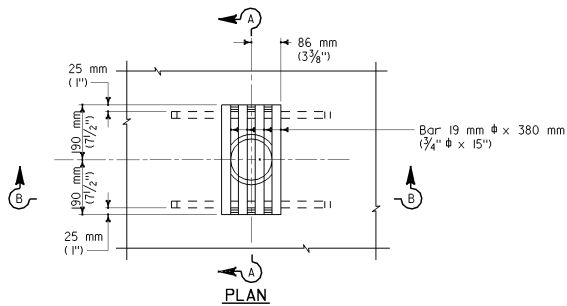
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
JOINT SEALS
[MAXIMUM MOVEMENT RATING=50 mm (2")]

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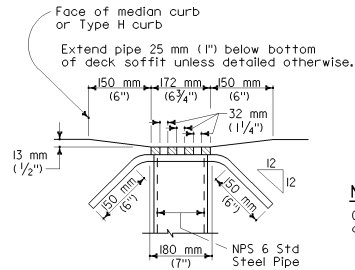
NO SCALE

B6-21

DIST. COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
REGISTERED CIVIL ENGINEER		July 1, 2002 PLANS APPROVAL DATE The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet. Caltrans now has a web site! To get to the web site, go to http://www.dtd.ca.gov		
REGISTERED PROFESSIONAL ENGINEER Efthymios Delis No. C51434 Exp. 6-30-06 STATE OF CALIFORNIA				



SECTION A-A

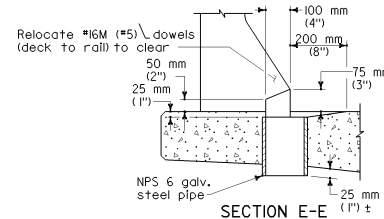
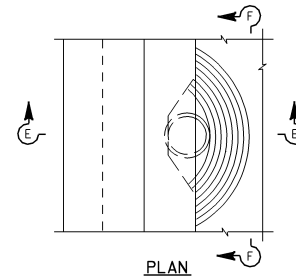


SECTION B-B

DRAIN - TYPE "A" DETAIL 7-1

NOTE

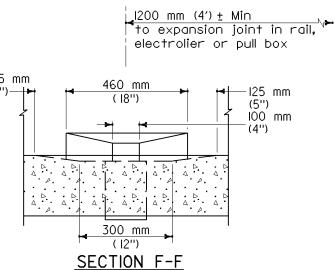
Galvanize drain after fabrication



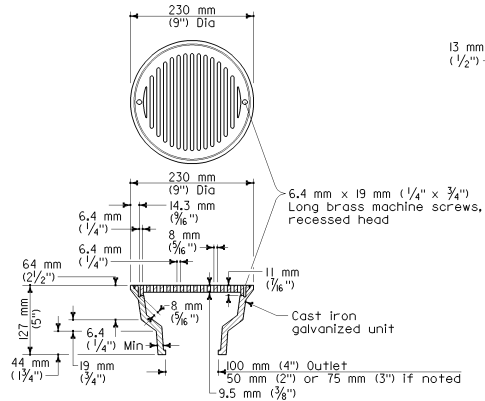
SECTION E-E

DRAIN - TYPE "B" DETAIL 7-3

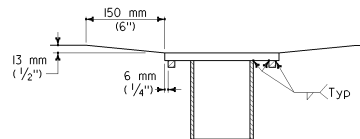
For Type 25 barrier railing



SECTION F-F

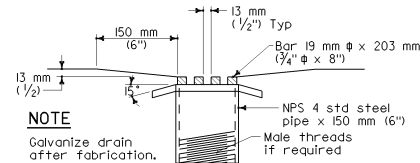


AREA DRAIN DETAIL 7-4



SECTION G-G

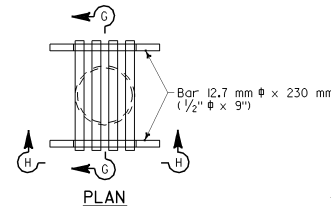
PEDESTRIAN STRUCTURE DRAIN DETAIL 7-5



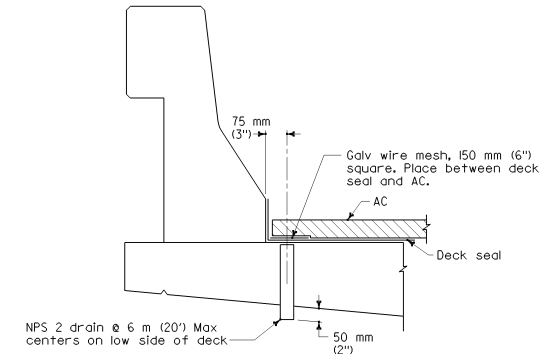
SECTION H-H

NOTE

Galvanize drain after fabrication.



PLAN




DECK BLEEDER DRAIN DETAIL 7-6

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
DECK DRAINS

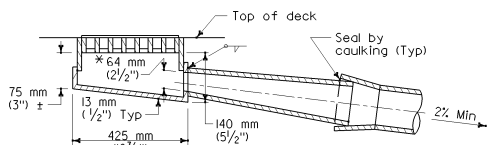
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NO SCALE

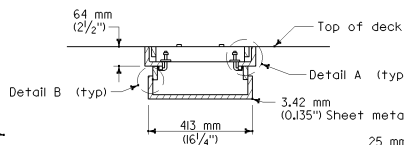
B7-5

NOTE  **NO SKEW**
D-2 shown, D-1 similar except for
pan depth and pipe not flattened

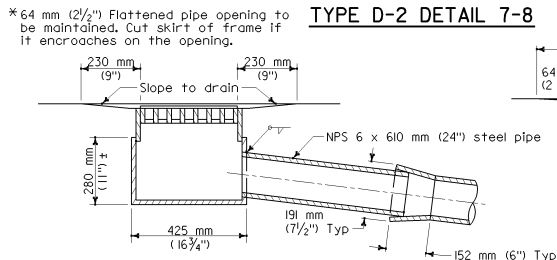
PLAN-DECK DRAIN ASSEMBLY



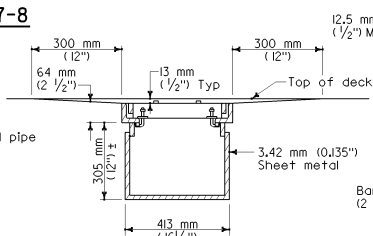
SECTION A-A



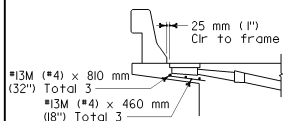
SECTION B-B



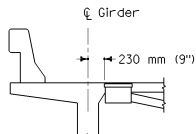
SECTION A-A



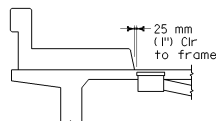
SECTION B-B



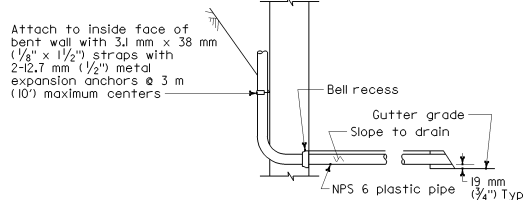
D-2 IN OVERHANG



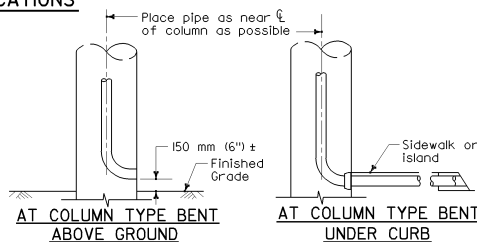
D-1 IN BAY



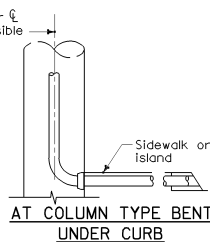
ELEVATION-DECK DRAIN LOCATIONS



AT WALL TYPE BENT

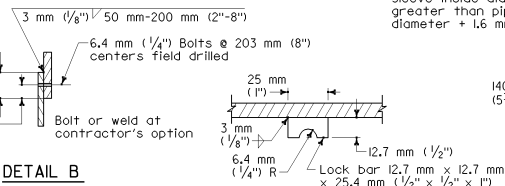


AT COLUMN TYPE BENT
ABOVE GROUND
DRAIN OUTLET

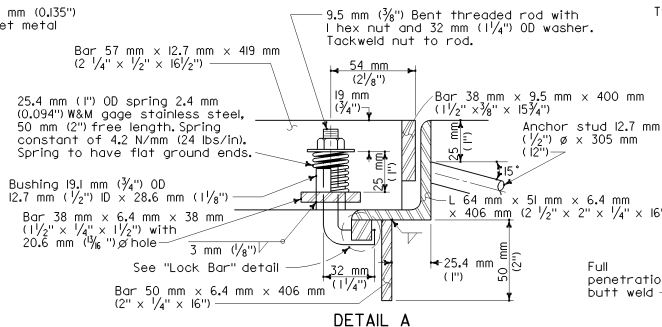


AT COLUMN TYPE BENT
UNDER CURB

VERTICAL HORIZ
DRAIN PIPE ALIGNMENT



LOCK BAR



DETAIL A

NOTE:

All pipe to be MP5 6 x 3/4" (J355) welded steel pipe except as noted and galvanized if not encased in concrete. Fitting and elbows shall have a minimum wall thickness of 3/16" (10). All joints or connections to be butt welded or connected by a steel pipe sleeve and to be smooth throughout inside of pipe except as noted. All bends to be on 460 mm (18") minimum radius measured along pipe. All bends to be smooth. Pipes not encased in concrete to be supported by suitable galvanized hangers at 3 m (10') maximum spacing throughout. Galvanize deck drain assembly after fabrication.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DECK DRAINS TYPES D-1 AND D-2

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NO SCALE

B7-6

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

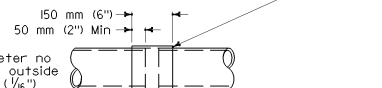
Jeff Sims
REGISTERED CIVIL ENGINEER

July 1, 2002
PLANS APPROVAL DATE

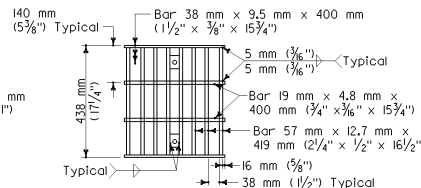
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REGISTERED PROFESSIONAL ENGINEER
Jeff Sims
E46471
Exp. 6-30-03
CIVIL
STATE OF CALIFORNIA

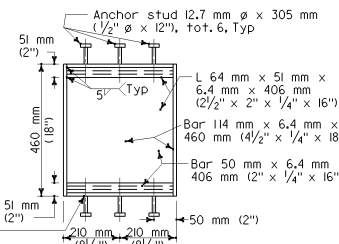
Apply adhesive sealant on pipe periphery to seal joint.
Secure each end of sleeve to pipe with 3-M5-0.8P x 12 mm
(#10-24 x 1/2") self tapping hex head screws. ➤



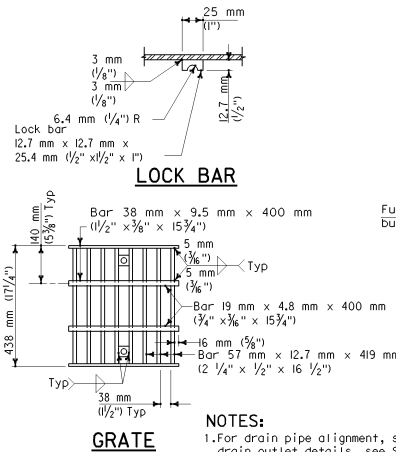
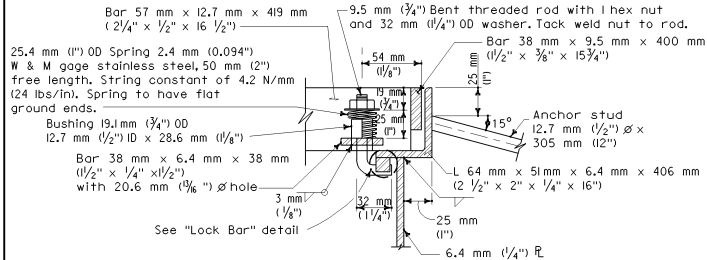
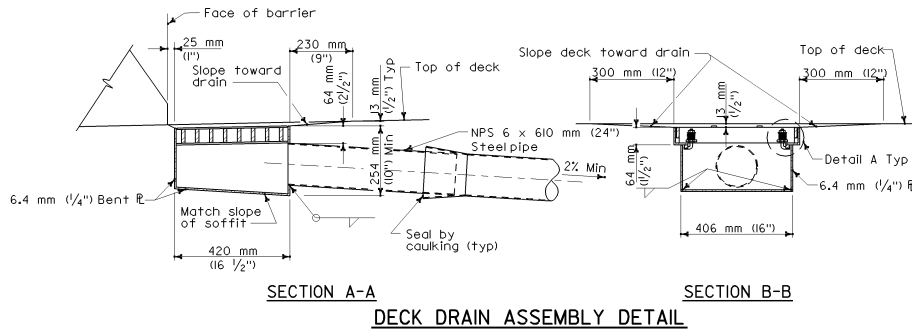
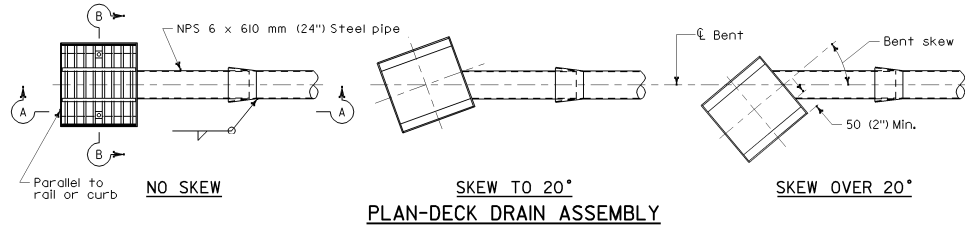
SLEEVE CONNECTION



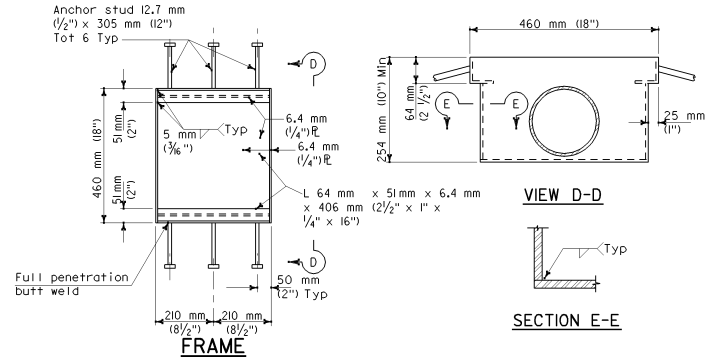
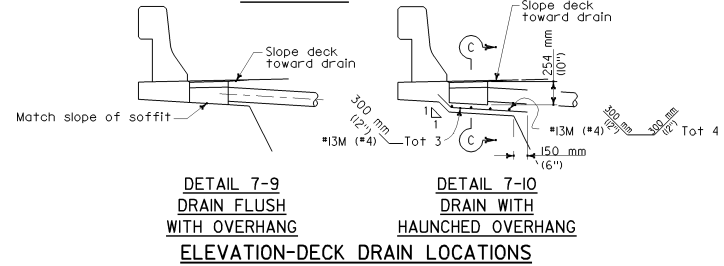
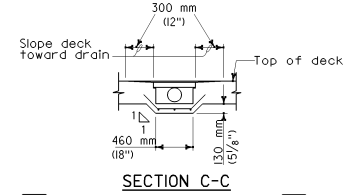
GRATE



FRAME

**NOTES:**

- For drain pipe alignment, sleeve connection and drain outlet details, see Standard Plan B7-6.
- Galvanize deck drain assembly after fabrication.

**SECTION E-E**

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
DECK DRAIN
TYPE D-3

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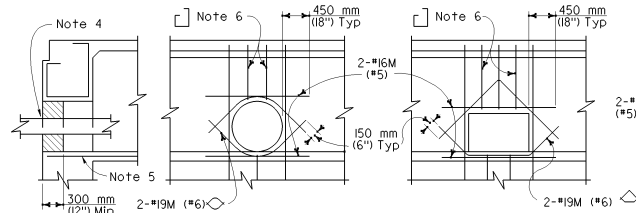
NO SCALE

B7-7

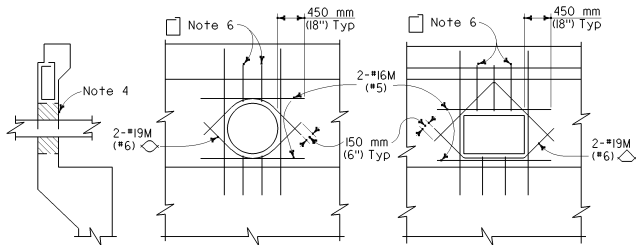
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<p>REGISTERED CIVIL ENGINEER</p> <p>July 1, 2002</p> <p>PLANS APPROVAL DATE</p> <p>The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.</p> <p>Caltrans now has a web site. To get to the web site, go to http://www.dot.ca.gov</p>						

Jeff Sims
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Exp. 6-30-03
STATE OF CALIFORNIA

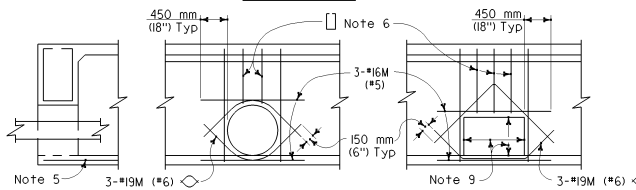
ABUTMENT DIAPHRAGMS



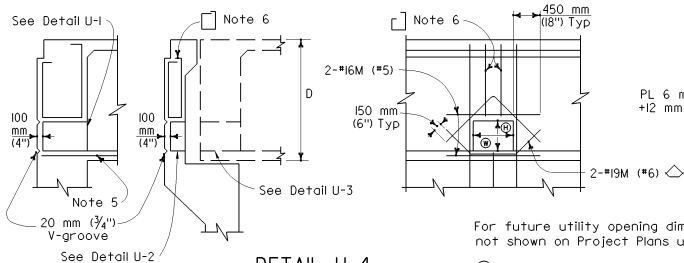
DETAIL U-1



DETAIL U-2



DETAIL U-3

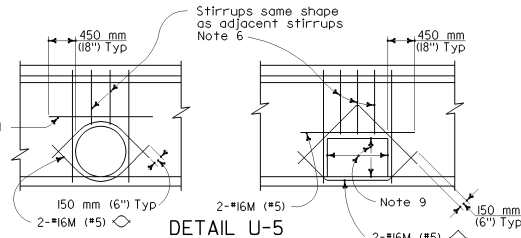


DETAIL U-4
(FOR FUTURE UTILITY OPENING)

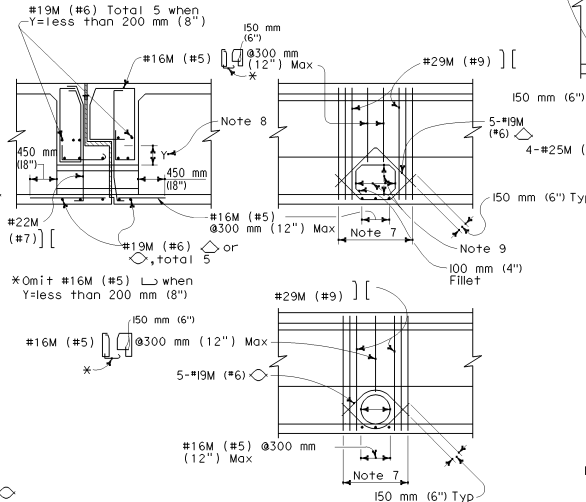
For future utility opening dimensions not shown on Project Plans use:

- (H) = 1/3 D or 450 mm (18") minimum, whichever is greater.
(W) = 1/3 D or 600 mm (24") minimum, whichever is greater.

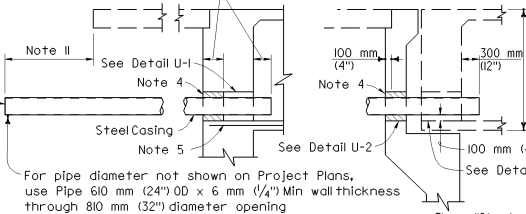
INTERMEDIATE DIAPHRAGMS AND HINGES



DETAIL U-5
AT INTERMEDIATE DIAPHRAGM

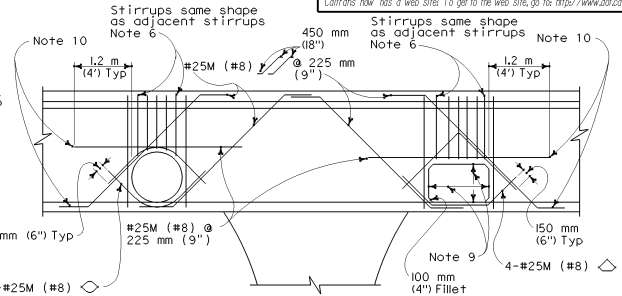


DETAIL U-6
AT HINGE



DETAIL U-8
(FOR FUTURE UTILITY PROVISIONS
UNDER APPROACH SLAB)

BENT CAPS



DETAIL U-7
NEAR OR BETWEEN COLUMNS

NOTES:

- The exact location, elevation, size and direction of openings shall be in accordance with the Project Plans and as directed by the Engineer.
- Girders not shown. See Project Plans.
- All reinforcement detailed to be placed in addition to reinforcement shown on Project Plans.
- Seal utilities at abutments with concrete or mortar, after tightly wrapping utility with 2 layers of 7 kg (15 lbs) building paper. If structure is prestressed, seal to be placed after stressing is completed.
- Main reinforcement to clear opening.
- Reinforcement to be same bar size and $\frac{2}{3}$ the spacing of adjacent reinforcement shown on Project Plans.
- Replace each set of 2-#29M (#9) bars cut off by opening. Place $\frac{1}{2}$ on each side of opening.
- When "Y" is less than 200 mm (8"), extend top of opening to bottom of bearing seat elevation.
- For future utility opening dimensions, see Project Plans and Detail U-4.
- When there is insufficient space to place reinforcement as shown, hook reinforcement into exterior girder.
- Unless otherwise shown on Project Plans, casing shall extend to the greater of 1.5 m (5') beyond the end of the approach slab, 1.5 m (5') beyond the end of the adjacent wingwall or 6 m (20') beyond the back of the abutment.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**UTILITY OPENING
BOX GIRDER**

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NO SCALE

B7-10

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

July 1, 2002

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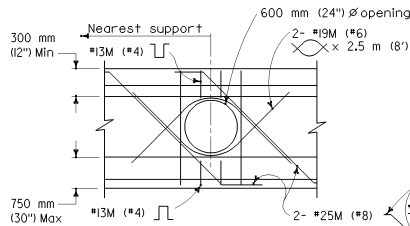
REGISTERED PROFESSIONAL ENGINEER

Madhesh Raghavendrachar

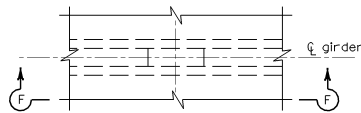
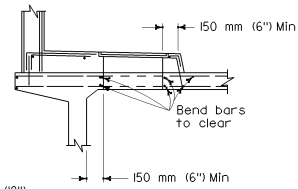
No. C51118

Exp. 9-30-05

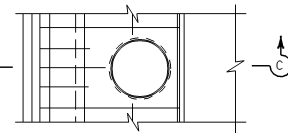
STATE OF CALIFORNIA



ELEVATION F-F

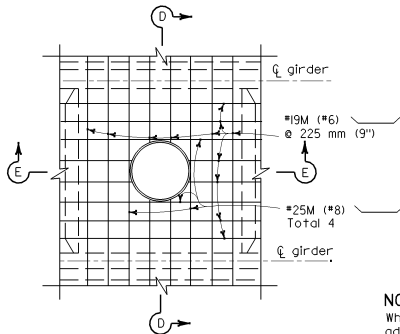
PART PLAN
GIRDER STEM ACCESS OPENING
DETAIL U41

SECTION C-C

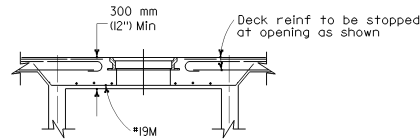
PART PLAN
SIDEWALK ACCESS OPENING
DETAIL U42

NOTES:

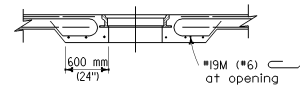
1. For exact location of openings see other sheets.
2. Location and size of manholes may be modified as directed by the Engineer, provided minimum dimensions are maintained.
3. All reinforcement detailed to be placed in addition to reinforcement shown on other sheets.



PART PLAN

DECK ACCESS OPENING
DETAIL U43

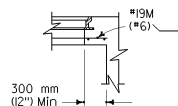
SECTION D-D



SECTION E-E

NOTE:

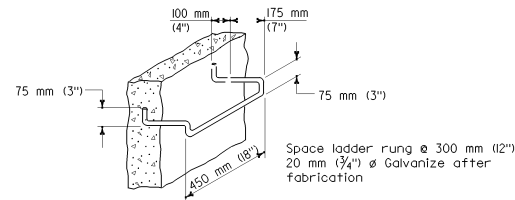
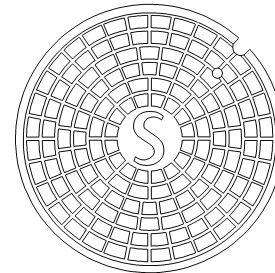
Where manhole is located adjacent to a diaphragm or abut, substitute Half Section E-E on one side of Section E-E.



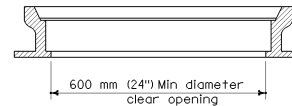
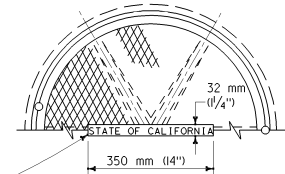
HALF SECTION E-E

NOTES:

1. The manhole frame and cover shall be made of gray cast iron. Mass for payment is 200 kg (435 lbs).
2. All parts of the manhole frame and cover except machined surfaces shall be coated with asphaltum paint.
3. The manhole frame and cover shall be tested for accuracy of fit and shall be marked in sets before delivery. The cover shall fit the frame snugly but not tightly.
4. Covers for use on sewer structures shall bear the letters "S"; on storm drain structures the letter "D"; on openings for utilities the letter "U".
5. The mass shall not vary more than ten percent from the mass for payment.
6. Step Inserts may be substituted for the standard step detail. Step inserts shall comply with State Industrial Safety requirements.

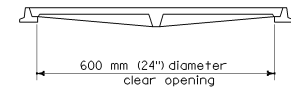
BAR STEP
LADDER RUNG DETAILS
DETAIL U44

TOP OF MANHOLE COVER

SECTION THROUGH FRAME
NON-ROCKING MANHOLE FRAME & COVER
FOR DECKS
DETAIL U45

Letters 25 mm (1 inch) high. No other inscription to appear on exposed surfaces.

TOP OF MANHOLE FRAME & COVER



SECTION THROUGH FRAME & COVER

MANHOLE FRAME & COVER
FOR SIDEWALKS
DETAIL U46

NOTE:

Frame and cover shall be cast iron. Mass for payment is 110 Kg (235 lbs).

Galvanize complete assembly after fabrication. The mass shall not vary more than ten percent from the mass for payment.

Cover shall be supplied with bolt down or locking devices.

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DEPARTMENT OF TRANSPORTATION

UTILITY DETAILS

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NO SCALE

B7-11

DIST.	COUNTY	ROUTE	KILOMETER	POST	SHEET	TOTAL
TOTAL PROJECT NO. SHEETS						

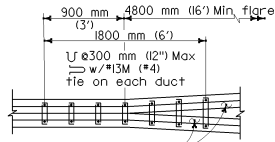
REGISTERED CIVIL ENGINEER

July 1, 2002
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No. C51119
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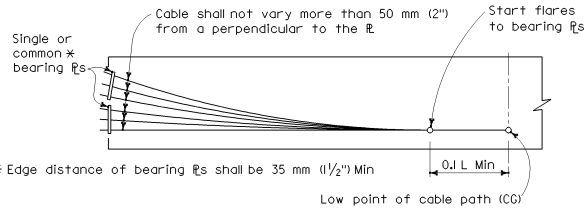


PLAN

#13M (#4) Duct ties

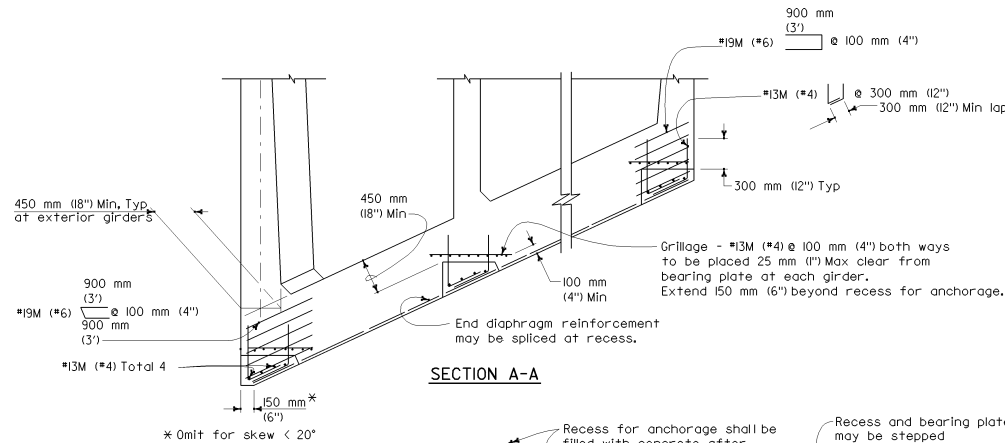
NOTE:

Place closed end of duct ties in direction of flare.

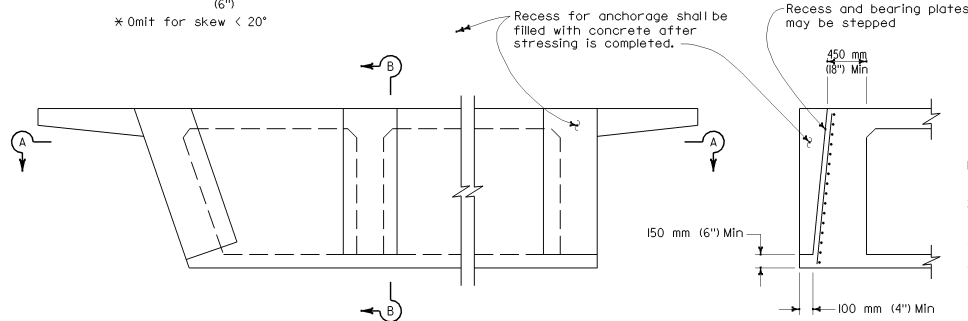


Edge distance of bearing fls shall be 35 mm (1 1/2") Min

Low point of cable path (CG)

STIRRUP REINFORCEMENT AT FLARE OF GIRDER STEM**BEARING PLATE PRESTRESSING PATH**

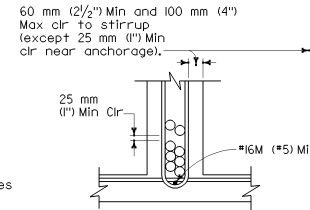
SECTION A-A



PRESTRESS ANCHORAGE DETAILS

AT SEAT TYPE ABUTMENTS

SECTION B-B



DUCTS 75 mm (3") OD AND LESS

DUCTS OVER 75 mm (3") OD
TO 114 mm (4 1/2") OD

DUCTS OVER 114 mm (4 1/2") OD

CLEARANCE REQUIREMENTS FOR DUCTS**NOTES:**

1. Duct patterns shown are for a 300 mm (12") wide girder stem. For other widths the minimum clearances must be maintained.
2. Stirrups may also be used. For continuous stirrups in girder stems greater than 400 mm (16") wide (tie at flares) use 2-#16M (#5) minimum U or U.
3. For additional details see Standard Plan B7-1.
4. Approval of the Engineer is required for deviations.

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DEPARTMENT OF TRANSPORTATION
**CAST-IN-PLACE
PRESTRESSED GIRDER DETAILS**

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NO SCALE

B8-5

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
<p>Michael Pope REGISTERED CIVIL ENGINEER No. C54503 Exp. 12-31-05 STATE OF CALIFORNIA</p> <p>July 1, 2002 PLANS APPROVAL DATE</p> <p>The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.</p> <p>Caltrans now has a web site. To get to the web site, go to: http://www.dot.ca.gov</p>					

NOTES:

Distribution of prestressing force:

Unless otherwise noted, the prestressing force shall be distributed with an approximately equal amount in each girder and shall be placed symmetrically about the center line of the structure. In slabs, the prestressing force shall be uniformly distributed across the slab.

Stressing sequence:

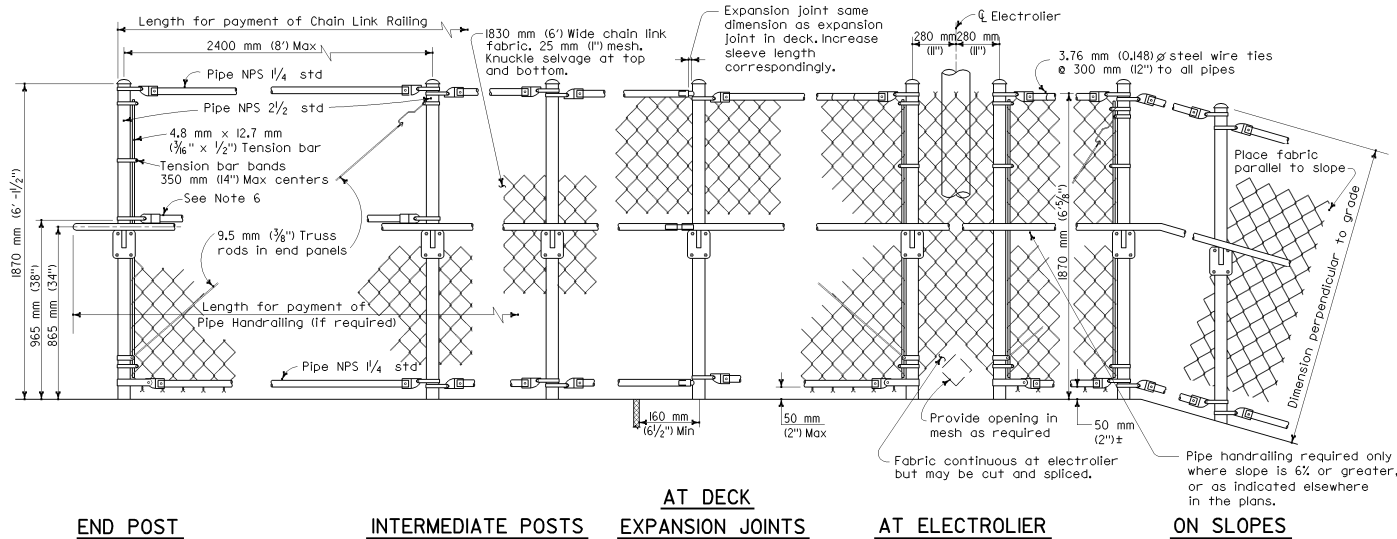
No more than 1/2 of the prestressing force in any girder may be applied before an equal force is applied in the adjacent girders. The maximum force variation between girders shall also not exceed the prestressing force of the largest tendon used in all girders. At no time during stressing operations will more than 1/6 of total prestressing force be applied eccentrically about the center line of the structure.

Girder stem may be flared near anchorage to provide clearances for the particular anchorage system.

Place duct ties, as shown for flare girder stem, at each location where ducts change horizontal direction.

Bar reinforcement interfering with the prestressing tendon alignment shall be adjusted, as approved by the Engineer.

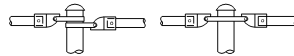
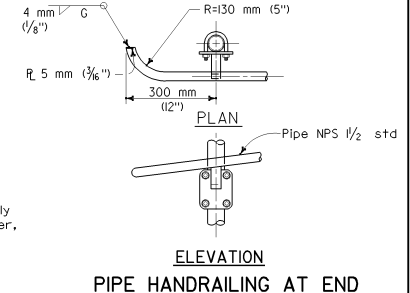
The Contractor shall submit working drawings to the Engineer for approval. The working drawings shall include any additions or rearrangement of reinforcing steel from that shown on the plans. Sufficient points shall be shown on the working drawings to place ducts accurately.



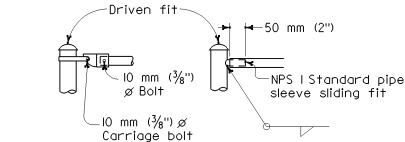
DIST.	COUNTY	ROUTE	KILOMETER	POST	SHEET	TOTAL
TOTAL PROJECT			TOTAL SHEETS			

Registered Civil Engineer
 July 1, 2002
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Ingrid Batlin
 No. 448719
 9-30-04
 CIVIL
 STATE OF CALIFORNIA



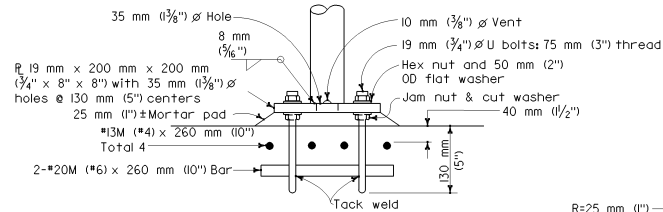
ALTERNATIVE DETAILS



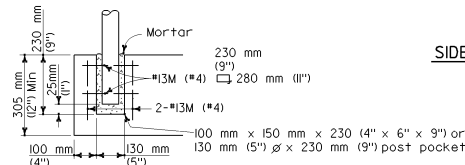
TYPICAL CONNECTION DETAILS

NOTES:

- Railing assembly except chain link fabric to be galvanized after fabrication.
- Peen all bolt threads.
- Railing shall conform to horizontal and vertical alignment. Posts shall be vertical. Top and bottom pipes shall be bent if radius is 45.0 m (148') or less; may be on 2.4 m (8') chords if radius is over 45.0 m (148').
- When railing is on slope, 1830 mm (6') chain link fabric shall be placed parallel to slope.
- Alternative details may be submitted by Contractor for Engineer's approval.
- Additional pipe NPS 1/4 standard required when radius is less than 45.0 m (150').

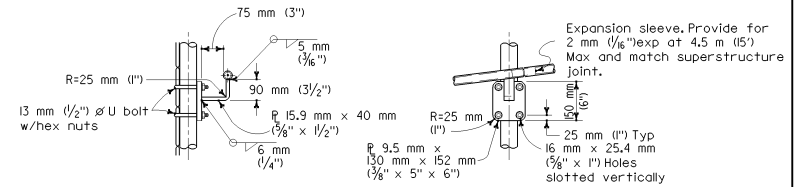


ANCHORAGE DETAIL



ALTERNATIVE ANCHORAGE DETAIL

May be used when thickness of concrete is 305 mm (12") or more.



PIPE HANDRAILING BRACKET

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

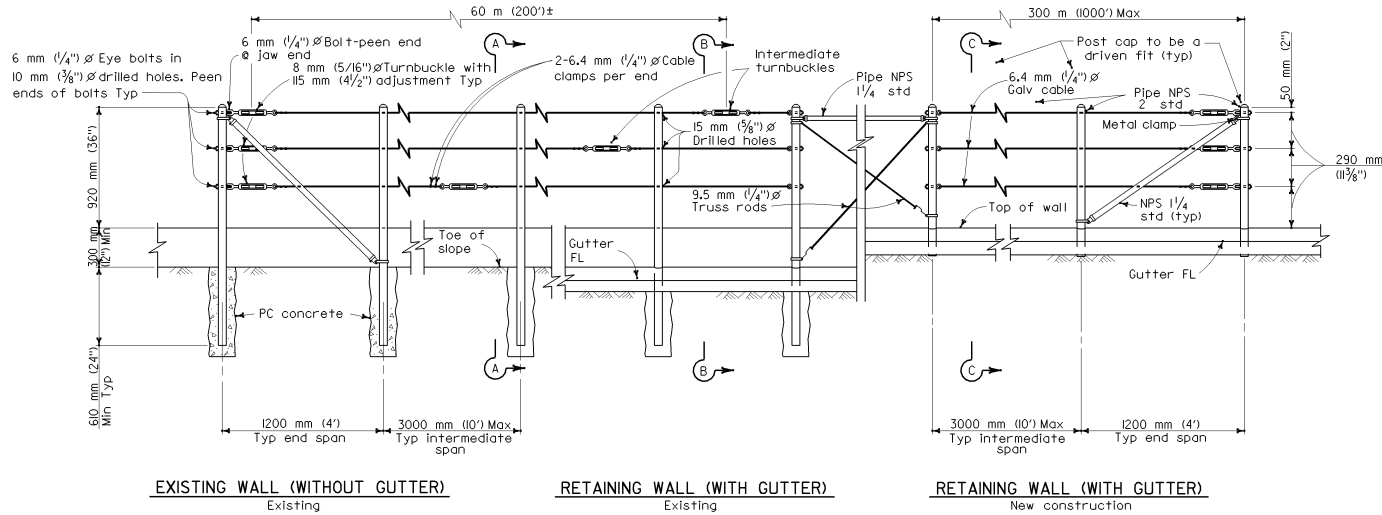
CHAIN LINK RAILING

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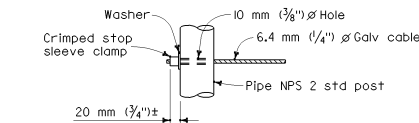
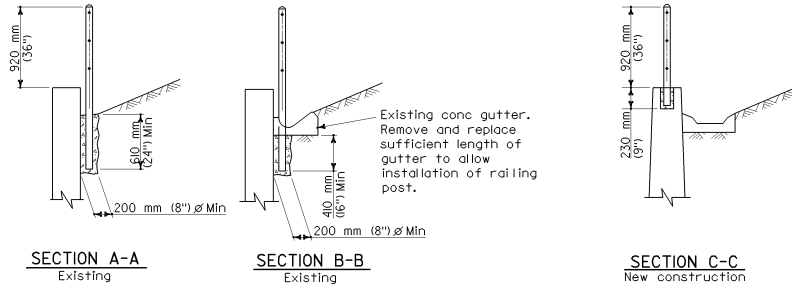
NO SCALE

B11-7

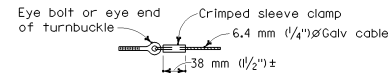
DIST.	COUNTY	ROUTE	KILOMETER POST	SHEET	TOTAL
				NO.	SHEETS
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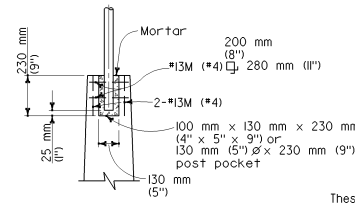
ELEVATION



ALTERNATIVE DEAD END ANCHORAGE



ALTERNATIVE CABLE CONNECTION



POST POCKET

NOTES:

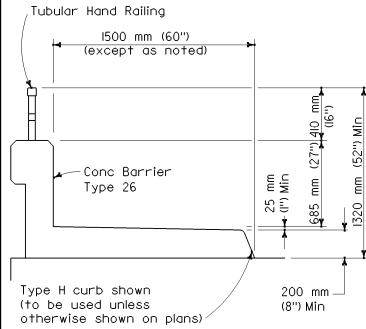
- Maximum distance between turnbuckles shall be 60 m (200')±.
- Intermediate turnbuckles to be placed in adjacent spans.
- Cable shall not be spliced between intermediate turnbuckles and end posts.
- All posts, cable and hardware to be galvanized.
- Posts to be vertical.
- Alignment of holes in posts may vary to conform to slope of top of retaining wall.
- The Contractor shall verify all dependent dimensions in the field before ordering or fabricating any material.
- Alternative details may be submitted by the Contractor for approval by the Engineer.
- Line posts shall be braced horizontally and trussed diagonally in both directions at intervals not to exceed 300 m (1000').
- Post pockets to be centered in top of wall.
- Typical end spans, braced in both directions, shall be constructed at changes in line where the angle of deflection is 15° or more.
- Provide thimbles at all cable loops.

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION CABLE RAILING

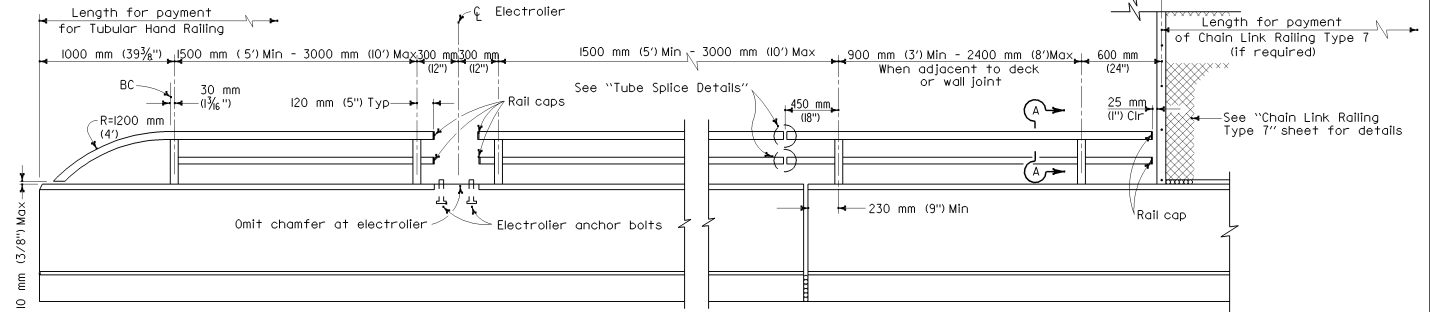
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NO SCALE

B11-47



TYPICAL SECTION



END POST

ELECTROLER

DECK OR WALL JOINT

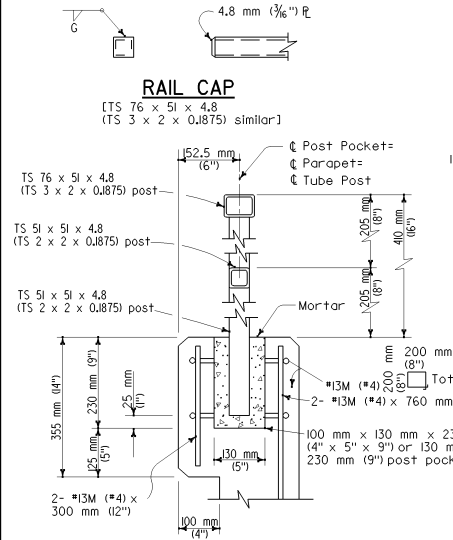
CHAIN LINK RAILING TYPE 7

ELEVATION

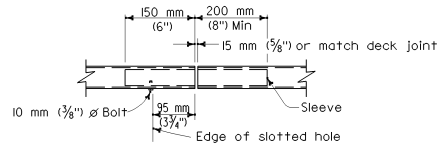
NOTES:

1. Galvanize rail assembly after fabrication.
2. Post shall be normal to railing.
3. Rail tubes shall be shop bent or fabricated to fit horizontal curve when radius is less than 300 m (985').
4. Tube splices shall be located in the tubes spanning deck or wall joints. Increase joint width in tubes to match expansion joint width and increase sleeve length correspondingly.
5. Top rail tube shall be continuous over not less than two posts except a short post spacing is permitted near deck or wall joints, electrolers, or other rail discontinuities as noted.
6. For details and reinforcement not shown see Standard Plan BI-54.
7. See project plans for limits of tubular hand railing.

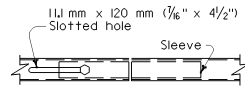
TUBE-WELDED SPLICE



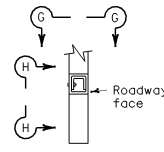
POST ANCHORAGE DETAILS



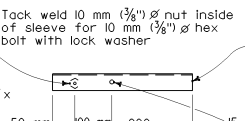
VIEW G-G



VIEW H-H



SECTION



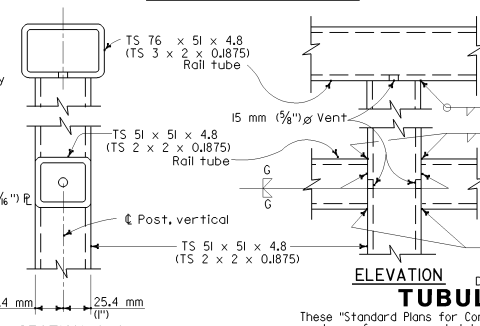
SLEEVE

TUBE SPLICE DETAILS

(TS 76 x 51 x 4.8
(TS 3 x 2 x 0.1875) similar)

NOTES:

- 10 mm (3/8") Nut tack welded to sleeve may be replaced by drilled and tapped hole in sleeve.



SECTION A-A

RAIL CONNECTION DETAILS

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
TUBULAR HAND RAILING

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NO SCALE

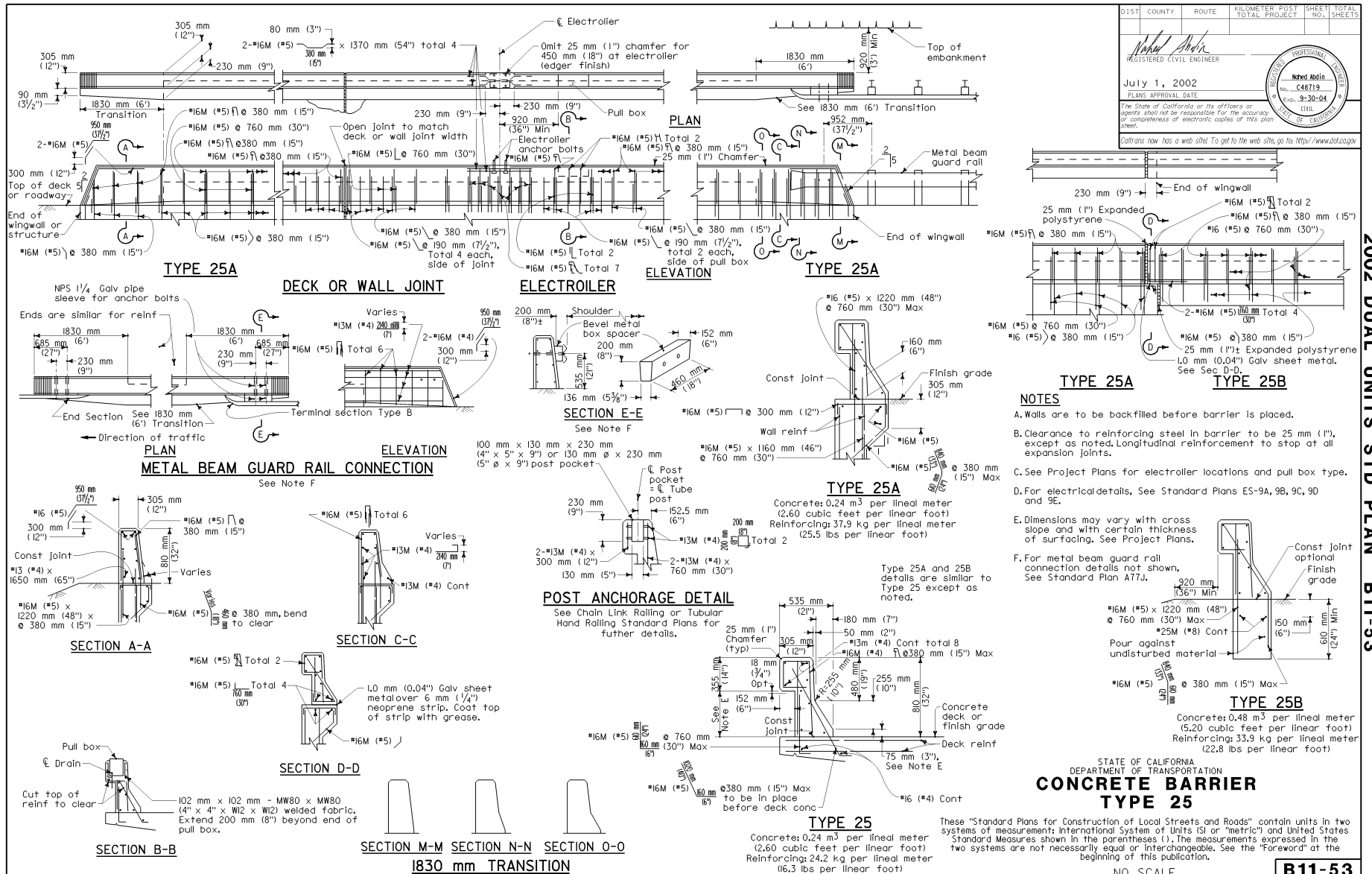
B11-51

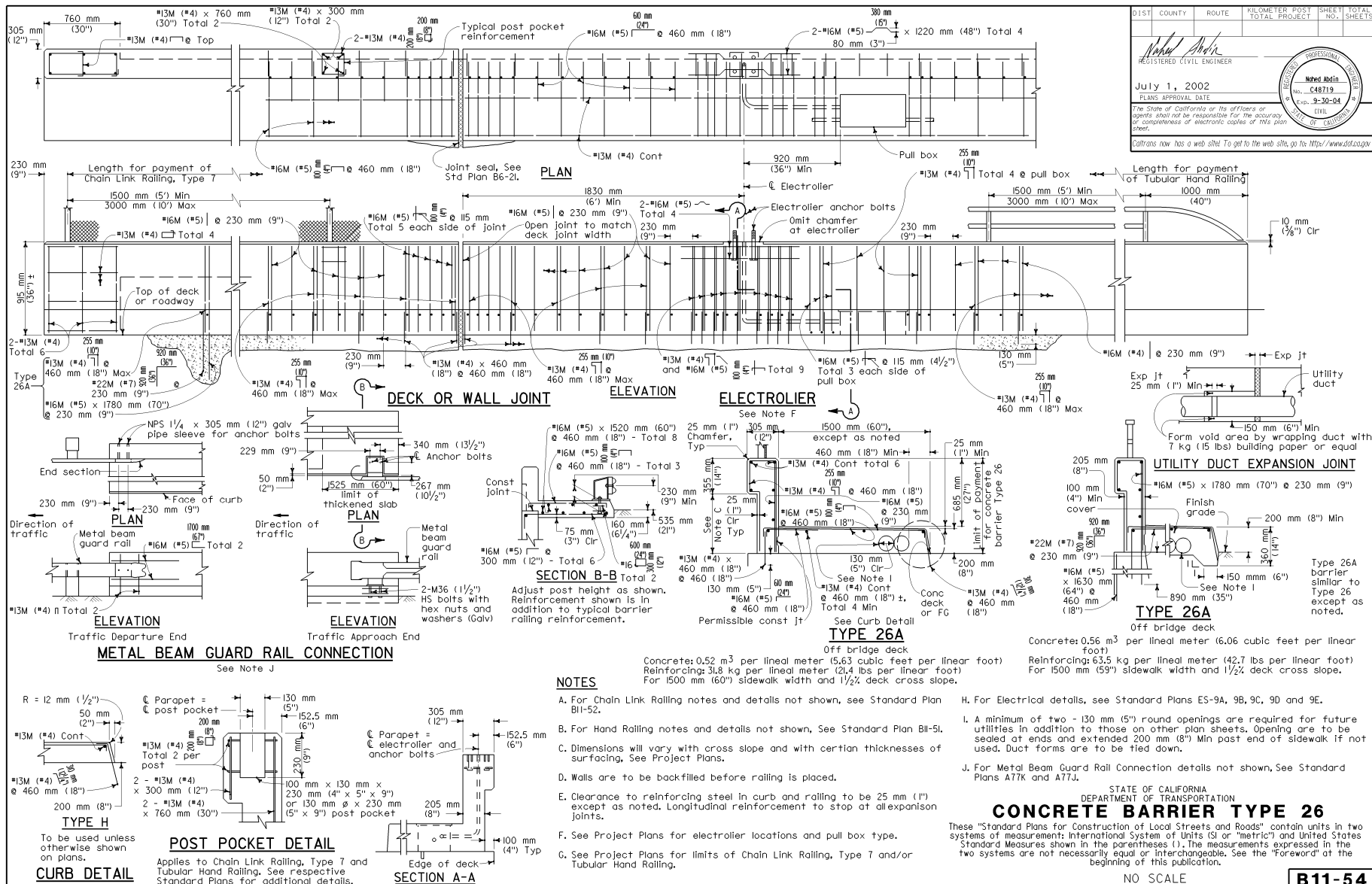
DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	POST NO.	SHEET TOTAL SHEETS

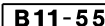
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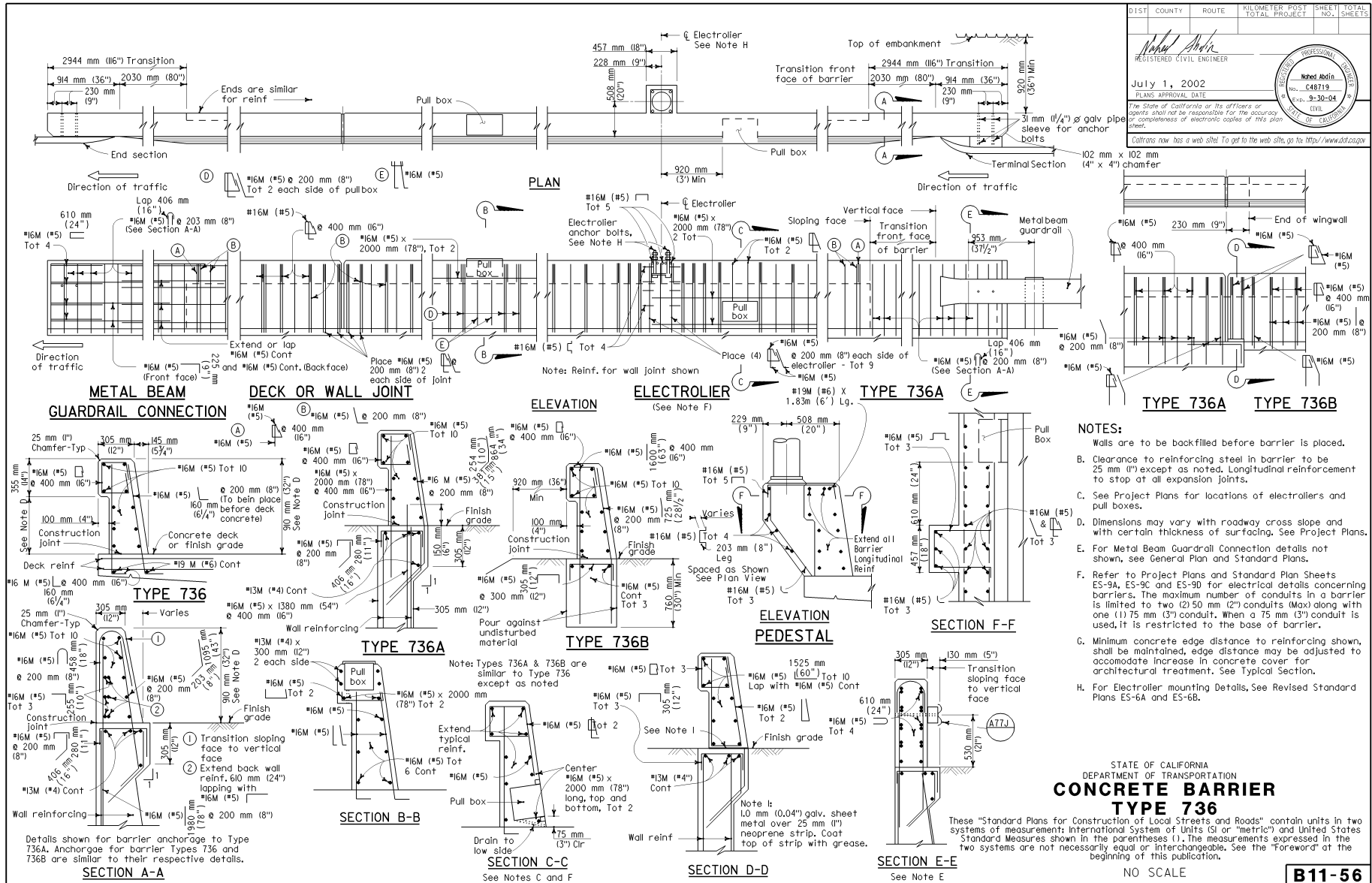
REGISTERED CIVIL ENGINEER
 Inghed Borin
 No. E48719
 Exp. 9-30-04
 CIVIL
 STATE OF CALIFORNIA

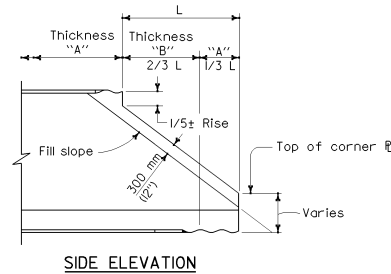
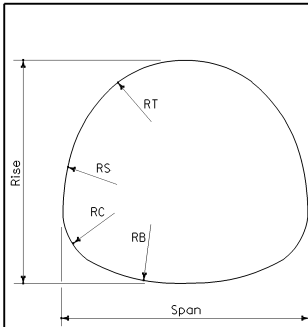










**NOTE:**

Thickness "B" two thicknesses greater than thickness "A", except for 6.5 mm (0.249") and 7 mm (0.280") thicknesses.

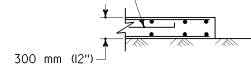
Skew-bevels not permitted with Alternative I. Cutoff dimensions are approximate only and may be varied by fabricator to suit plate layout.

ALTERNATIVE I

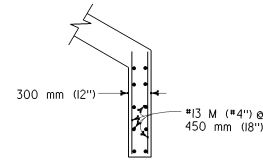
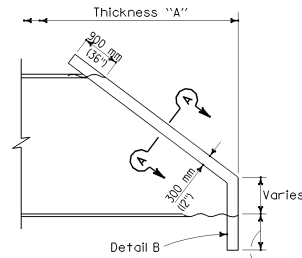
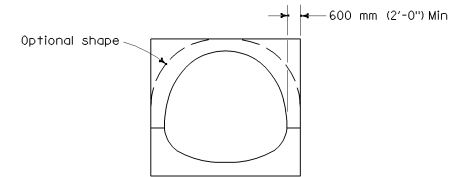
Span	Rise	MAXIMUM HEIGHT OF FILL										LAYOUT DATA			
		Thickness													
		2.5 mm (0.099")	3.5 mm (0.138")	4.5 mm (0.168")	2.5 mm (0.099")	3.5 mm (0.138")	4.5 mm (0.168")	5.5 mm (0.218")	6.5 mm (0.249")	7.0 mm (0.280")					
		Soil Pressure 144 kPa (1.5 tons/SOFT)										RT	RS	RC	RB
For soil pressures see Table A															
3708 mm (12'-2")	3353 mm (11'-0")	4.9 m (16')	4.9 m (16')	4.9 m (16')	5.2 m (17')	7.9 m (26')	10.0 m (33')	14.0 m (46')	16.5 m (54')	18.0 m (59')	1727 mm (68")	2362 mm (93")	965 mm (38")	3404 mm (134")	
3937 mm (12'-11")	3429 mm (11'-3")	4.6 m (15')	4.6 m (15')	4.6 m (15')	4.9 m (16')	7.3 m (24')	9.4 m (31')	13.1 m (43')	15.5 m (51')	17.1 m (56')	1854 mm (73")	2413 mm (95")	965 mm (38")	3658 mm (144")	
4013 mm (13'-2")	3632 mm (11'-11")	4.3 m (14')	4.3 m (14')	4.3 m (14')	4.9 m (16')	7.3 m (24')	9.4 m (31')	12.8 m (42')	15.2 m (50')	16.8 m (55')	1854 mm (73")	2616 mm (103")	965 mm (38")	4039 mm (159")	
4261 mm (13'-10")	3734 mm (12'-3")	4.0 m (13')	4.0 m (13')	4.0 m (13')	4.6 m (15')	6.7 m (22')	8.8 m (29')	12.5 m (41')	14.6 m (48')	15.8 m (52')	1956 mm (77")	2743 mm (108")	965 mm (38")	4166 mm (164")	
4293 mm (14'-1")	3912 mm (12'-10")	4.0 m (13')	4.0 m (13')	4.0 m (13')	4.6 m (15')	6.7 m (22')	8.8 m (29')	12.2 m (40')	14.3 m (47')	15.5 m (51')	1956 mm (77")	2921 mm (115")	965 mm (38")	4623 mm (182")	
4420 mm (14'-6")	4115 mm (13'-6")	4.0 m (13')	4.0 m (13')	4.0 m (13')	4.3 m (14')	6.4 m (21')	8.5 m (28')	11.9 m (39')	14.0 m (46')	15.2 m (50')	1981 mm (78")	3327 mm (131")	965 mm (38")	4420 mm (174")	
4521 mm (14'-10")	4267 mm (14'-0")	4.0 m (13')	4.0 m (13')	4.0 m (13')	4.3 m (14')	6.4 m (21')	8.2 m (27')	11.6 m (38')	13.7 m (45')	14.9 m (49')	2007 mm (79")	3454 mm (136")	965 mm (38")	4877 mm (192")	
4724 mm (15'-6")	4369 mm (14'-4")	3.7 m (12')	3.7 m (12')	3.7 m (12')	4.0 m (13')	6.1m (20')	7.9 m (26')	11.0 m (36')	13.1 m (43')	14.3 m (47')	2134 mm (84")	3505 mm (138")	965 mm (38")	5105 mm (201")	
4801 mm (15'-9")	4597 mm (15'-1")	3.7 m (12')	3.7 m (12')	3.7 m (12')	4.0 m (13')	6.1m (20')	7.9 m (26')	10.7 m (35')	12.8 m (42')	14.0 m (46')	2108 mm (83")	3810 mm (150")	965 mm (38")	5385 mm (212")	
4978 mm (16'-4")	4699 mm (15'-5")	3.7 m (12')	3.7 m (12')	3.7 m (12')	4.0 m (13')	5.8 m (19')	7.6 m (25')	10.4 m (34')	12.2 m (40')	13.4 m (44')	2184 mm (86")	3988 mm (157")	965 mm (38")	5461 mm (215")	
5004 mm (16'-5")	4902 mm (16'-1")	3.4 m (11')	3.4 m (11')	3.4 m (11')	5.8 m (19')	7.6 m (25')	10.4 m (34')	12.2 m (40')	13.4 m (44')	14.6 m (48")	2235 mm (88")	4013 mm (158")	965 mm (38")	6883 mm (271")	
5105 mm (16'-9")	4953 mm (16'-3")	3.4 m (11')	3.4 m (11')	3.4 m (11')	5.8 m (19')	7.3 m (24')	10.0 m (33')	11.9 m (39')	13.1 m (43')	14.3 m (47')	2261 mm (89")	4242 mm (167")	965 mm (38")	6274 mm (247")	
5258 mm (17'-3")	5182 mm (17'-0")	4.3 m (14')	4.3 m (14')	4.3 m (14')	5.5 m (18')	7.0 m (23')	9.8 m (32')	11.6 m (38')	12.8 m (42')	14.0 m (46')	2286 mm (90")	4420 mm (174")	1194 mm (47")	5461 mm (215")	
5588 mm (18'-4")	5156 mm (16'-11")	4.0 m (13')	4.0 m (13')	4.0 m (13')	6.7 m (22")	9.1 m (30')	11.0 m (36')	11.9 m (39')	12.8 m (42")	14.0 m (46")	2515 mm (99")	3988 mm (157")	1194 mm (47")	6325 mm (249")	
5842 mm (19'-2")	5232 mm (17'-2")	4.0 m (13")	4.0 m (13")	4.0 m (13")	6.4 m (21")	8.8 m (29")	10.7 m (35")	11.6 m (38")	12.8 m (42")	14.0 m (46")	2667 mm (105")	3962 mm (156")	1194 mm (47")	6706 mm (264")	
5944 mm (19'-6")	5359 mm (17'-7")	3.7 m (12")	3.7 m (12")	3.7 m (12")	6.4 m (21")	8.8 m (29")	10.4 m (34")	11.3 m (37")	12.8 m (42")	14.0 m (46")	2718 mm (107")	4013 mm (158")	1194 mm (47")	7544 mm (297")	
6198 mm (20'-4")	5436 mm (17'-10")	3.7 m (12")	3.7 m (12")	3.7 m (12")	8.5 m (28")	10.0 m (33")	11.0 m (36")	12.8 m (42")	14.0 m (46")	15.2 m (50")	2870 mm (113")	3962 mm (156")	1194 mm (47")	7916 mm (314")	

Structures require strutting for fill heights below heavy lines. See Note A.

20 mm (3/4") Hook bolts @ 600 mm (24") ± centers. Length as provided by manufacturer.

**SECTION A-A****NOTE:**

Reinforce both faces of concrete collar with #13 M (#4) @ 450 mm (18") both ways. Maximum skew is 35°.

**DETAIL B****SIDE ELEVATION****END BEVELS****ALTERNATIVE 2****END ELEVATION****NOTES:**

- For strutting requirements of structural steel plate vehicular undercrossing during construction, see Standard Plan D88A.
- Minimum cover from crown to shoulder hinge point = 1.5 m (5').
- Backfill shall be brought up uniformly on both sides of the structure.
- Minimum cover for construction loading, see Standard Plan D88.

Reinforced concrete: $F_s = 165 \text{ MPa}$ (24,000 psi)

$N = 10$

$F_c = 9 \text{ MPa}$ (1,300 psi)

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DEPARTMENT OF TRANSPORTATION

STRUCTURAL STEEL PLATE VEHICULAR UNDERCROSSING

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NO SCALE

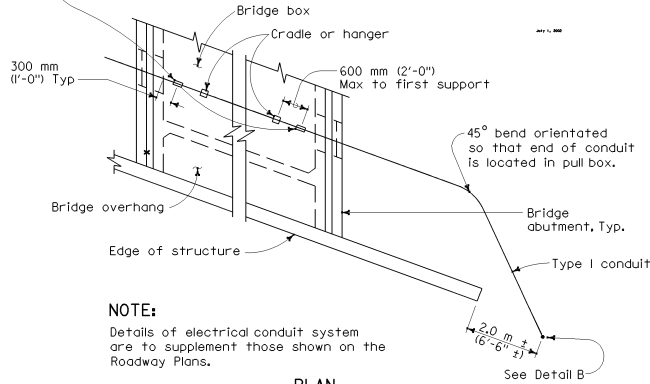
B14-1

DIST	COUNTY	ROUTE	POST MILES	SHEET TOTAL
			TOTAL PROJECT	NO. SHEETS

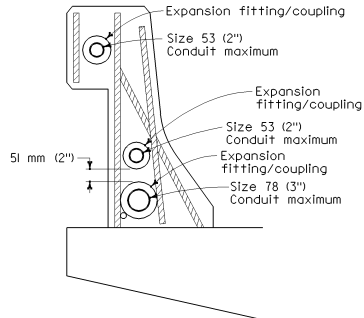
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REGISTERED ELECTRICAL ENGINEER
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J.S. Sandhu
No. E17803
Exp. 9-30-04
ELECTRICAL
STATE OF CALIFORNIA

Conduit expansion fitting. See Standard Plan ES-7C Detail X. Provide for a minimum movement or 38 mm (1 1/2") [1+3 mm (1/2")] abutment where no expansion joints are located. Other expansion assemblies shall provide movements according to adjacent expansion joint size. Supports are to be located 600 mm (2'-0") maximum each side of expansion assemblies.



**PLAN
COMMUNICATION OR
SPRINKLER CONTROL CONDUITS**

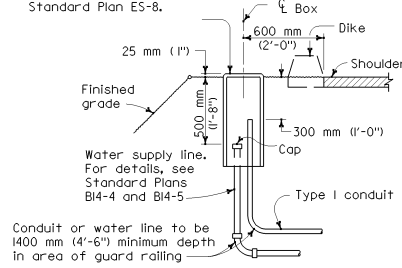


CONDUIT IN BRIDGE RAILING

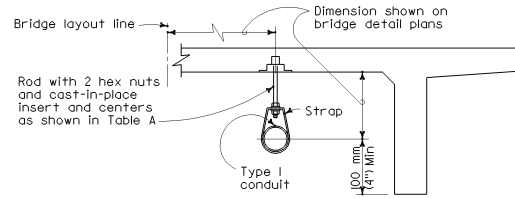
NOTES:

1. The maximum conduit sizes shown are for a straight run across the bridge without pull boxes.
2. In a bridge railing with lighting standards or pull boxes, reduce size of affected conduits as needed.

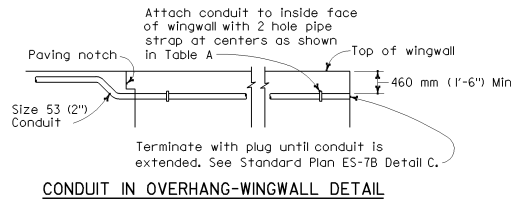
#5 Concrete pull box and extension. See Standard Plan ES-8.



DETAIL B



**OTHER THAN BOX GIRDER
CONDUIT HANGER SUPPORT DETAILS**



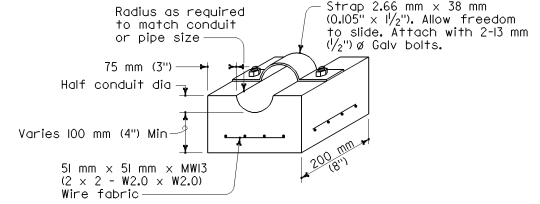
CONDUIT IN OVERHANG-WINGWALL DETAIL

CONDUIT LOCATIONS

For Size 53 (2") conduit only except as noted. For location, see Bridge Detail Plans.

TABLE A

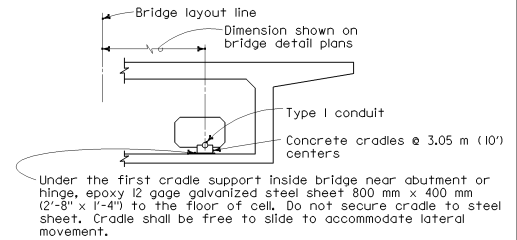
Conduit	Size 63 or less (2 1/2" or less)	Size 78 (3")	Size 91 mm (3 1/2")
Rod	10 mm ø (3/8" ø)	13 mm ø (1/2" ø)	16 mm ø (5/8" ø)
Strap	2.28 mm x 25.4 mm (0.090" x 1")	2.28 mm x 25.4 mm (0.090" x 1")	2.66 mm x 38 mm (0.105" x 1 1/2")
Support spacing	3.05 m (10')	3.05 m (10')	3.05 m (10')



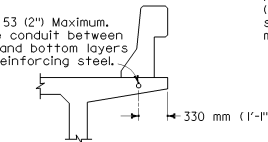
NOTES:

1. Cradles to be precast concrete.
2. Secure all cradles to bottom slab of bridge with epoxy adhesive, except as provided below.

CONCRETE CRADLE



**BOX GIRDER
CONDUIT SUPPORT DETAILS**



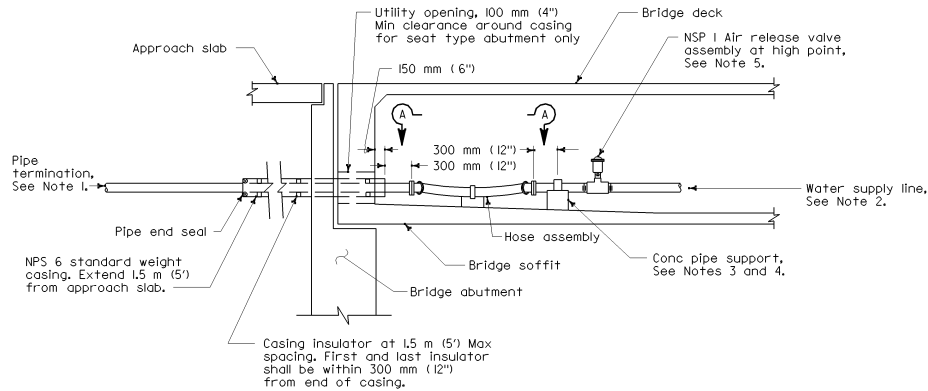
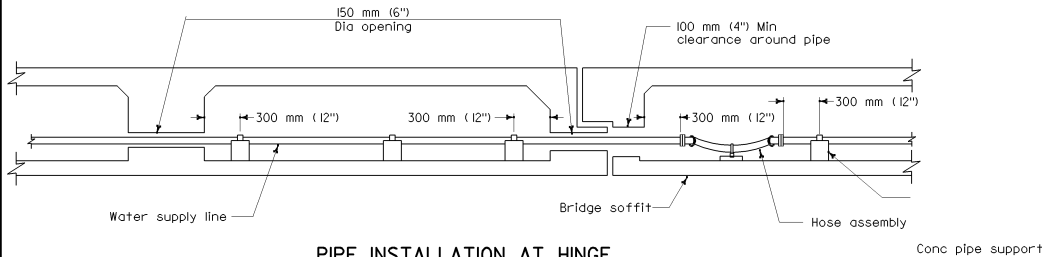
CONDUIT IN OVERHANG

**STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
COMMUNICATION AND
SPRINKLER CONTROL
CONDUITS [CONDUIT LESS
THAN SIZE 103 (4")]**

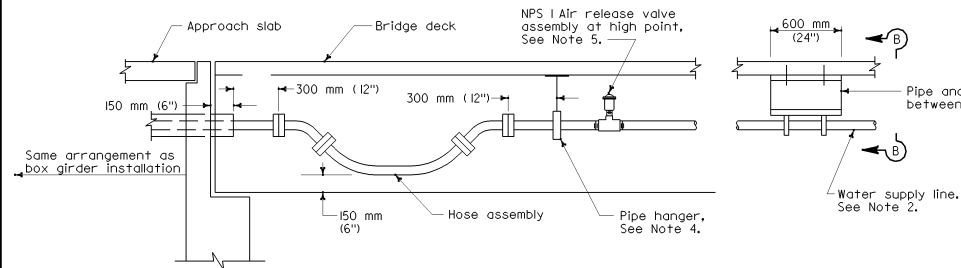
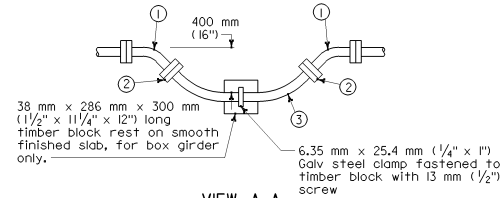
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NO SCALE

B14-3

**BOX GIRDER INSTALLATION****PIPE INSTALLATION AT HINGE**

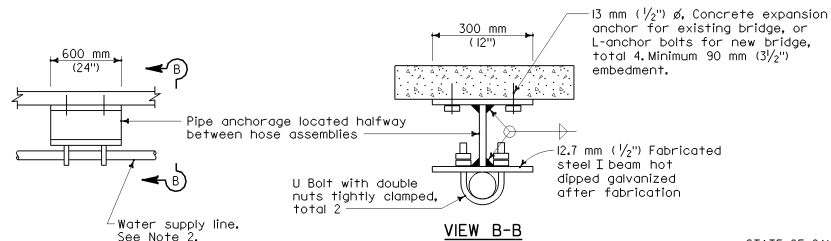
Same for hanger type installation

**INSTALLATION FOR OTHER STRUCTURE TYPES****VIEW A-A
HOSE ASSEMBLY****NUMBERED ITEM**

- ① 45 degree flanged elbow with insulated flange connection.
- ② Flanged hose fitting.
- ③ Hose 2.0 m (6.5') live length, size shall be same as pipe.

NOTES

1. Extend pipe 1.5 m (5') + beyond the edge of shoulder or as shown on bridge plans. Terminate in a pull box as shown on Standard Plan B14-3, Detail B.
2. Water supply line shall be installed parallel to bridge soffit or deck.
3. For concrete pipe support, pipe shall be tightly clamped at the pipe support located halfway between hose assemblies. At all other supports, pipe clamp shall be shimmed with steel washer plate to provide 5 mm (3/16") clearance between pipe and clamp.
4. Maximum spacing between pipe hangers or supports shall be 3.0 m (10') unless otherwise detailed on the plans.
5. Install air release valve using threaded tee or pipe saddle.
6. Openings through diaphragms and bent caps shall be 150 mm (6") diameter unless otherwise detailed on the plans.
7. For details of pipe hanger and concrete pipe support, See Standard Plan B14-5.

**VIEW B-B**

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**WATER SUPPLY LINE
(BRIDGE)**

(PIPE SIZES LESS THAN NPS 4)

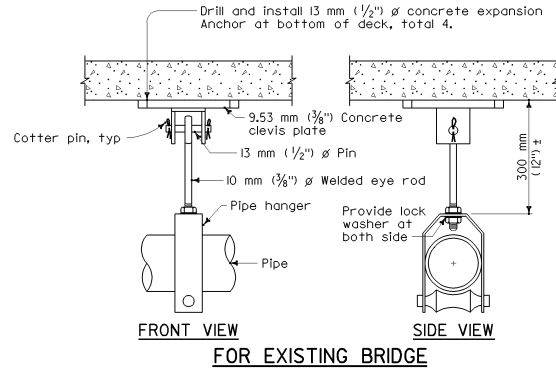
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NO SCALE

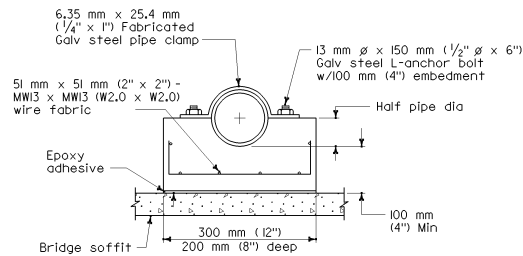
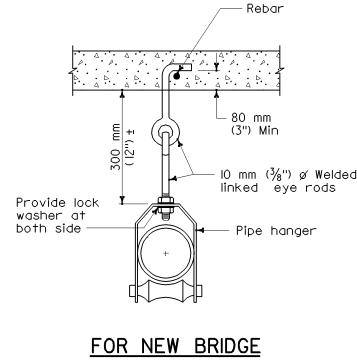
B14-4

DIST.	COUNTY	ROUTE	KILOMETER TOTAL PROJECT	POST NO.	SHEET TOTAL SHEETS

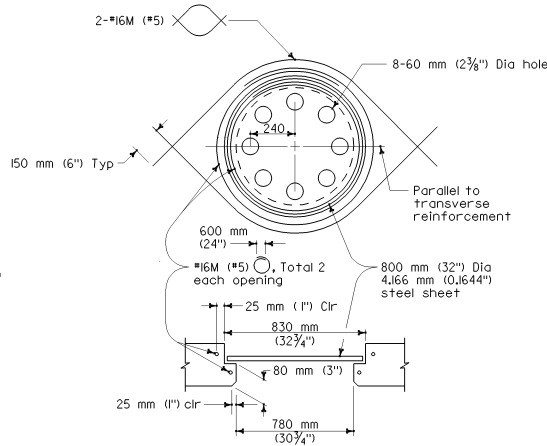
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PIPE HANGER



CONCRETE PIPE SUPPORT



Locate where called for on bridge plans. Adjust reinforcement to clear opening. Plate must be installed before top deck is placed.

SOFFIT ACCESS OPENING

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

REGISTERED MECHANICAL ENGINEER

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Hao T. Phan
No. M20263
9-30-04
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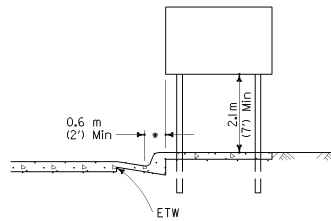
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**WATER SUPPLY LINE
(BRIDGE)**

(PIPE SIZES LESS THAN NPS 4)

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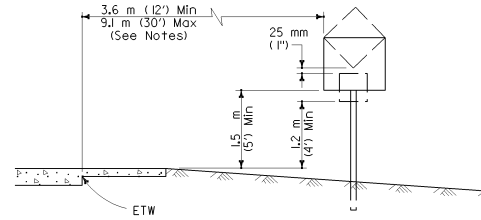
NO SCALE

B14-5



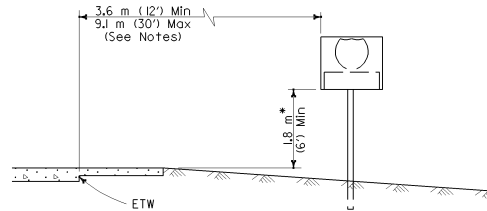
* 0.3 m (1') Min where lateral clearance limited

URBAN LOCATIONS



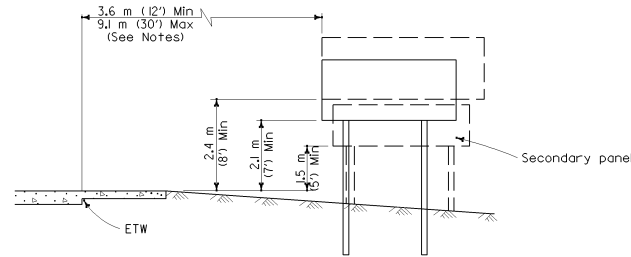
RURAL LOCATIONS

CONVENTIONAL HIGHWAYS AND INTERCHANGE AREAS



* 1.5 m (5') Min at 9.1 m (30') out

REGULATORY AND WARNING SIGNS AND ROUTE SHIELDS



GUIDE SIGNS

FREEWAY AND EXPRESSWAY LOCATIONS

NOTES

When clear roadside recovery areas are provided, signs shall be placed as far from the edge of traveled way as possible, up to a maximum of 9.1 m (30'). When possible they shall be placed in protected locations.

Signs in medians shall be placed at midpoint of median up to a maximum distance of 9.1 m (30') from edge of traveled way. When appropriate, signs for opposing directions shall be placed back to back.

ETW = Edge of Traveled Way

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

Greg W. Edwards
REGISTERED CIVIL ENGINEER

July 1, 2002
PLANS APPROVAL DATE

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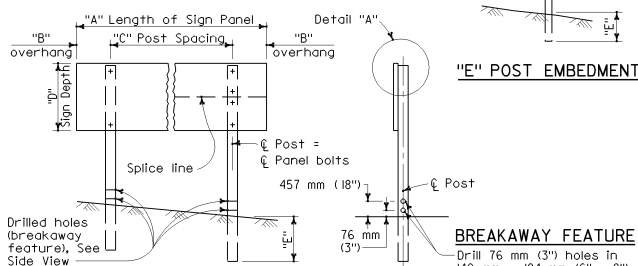
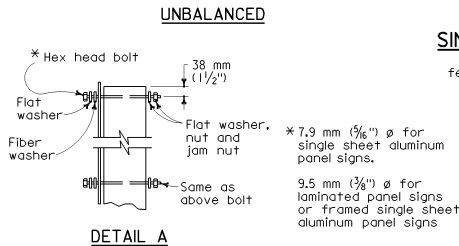
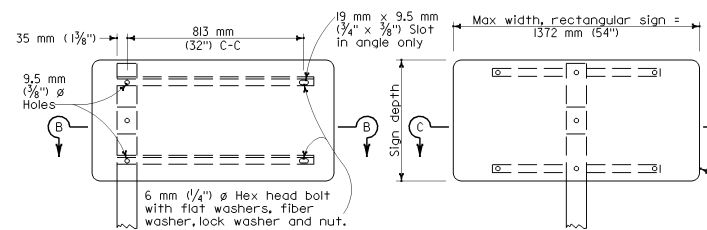
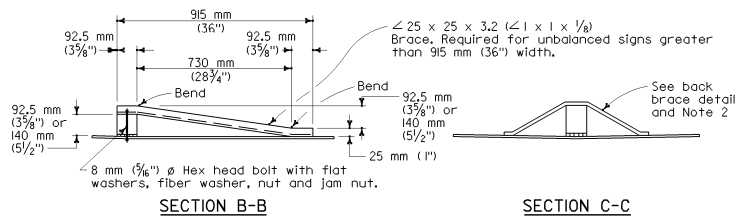
Greg W. Edwards
C36386
No. 6-30-04
CIVIL
STATE OF CALIFORNIA

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION ROADSIDE SIGN TYPICAL INSTALLATION DETAILS NO. 1

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NO SCALE

RS1

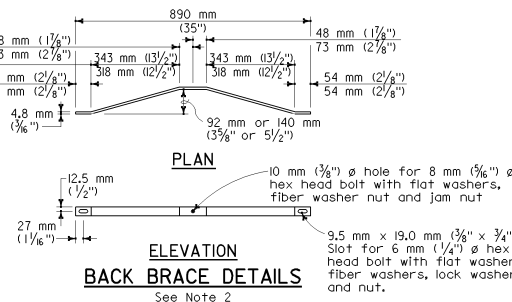
**NOTE**

Bolt hole layout is dependent on type of panel. Drill holes in post to match panel furnished.

ELEVATION**SIDE VIEW****TWO POST INSTALLATION****BREAKAWAY FEATURE**

Drill 76 mm (3") holes in 140 mm x 184 mm (6" x 8") post, 51 mm (2") holes in 140 mm x 140 mm (6" x 6") post, and 38 mm (1 1/2") holes for 89 mm x 140 mm (4" x 6") posts. Orient hole axis parallel to axis of sign. See Note 6 for tolerances of drilled holes.

POST SIZE	"E"
89 mm x 89 mm (4" x 4")	1100 mm (3.5')
89 mm x 140 mm (4" x 6")	1400 mm (4.5')
140 mm x 140 mm (6" x 6")	1550 mm (5.0')
140 mm x 184 mm (6" x 8")	1850 mm (6.0')

**NOTES**

- Place long dimension of post cross section normal to sign axis. See Section C-C.
- Balanced single post installations of unframed single sheet aluminum panel signs shall have block spacers if 457 mm (18") or more in depth and a combination of block spacers and back braces if 457 mm (18") or more in depth and 864 mm (34") or more in width. Sign panels less than 457 mm (18") in depth and 864 mm (34") or more in width shall have back braces only.
- For post size, see sign layout format or quantity sheets.
- Balanced single post installations of Laminated Panel and Framed single sheet panel signs require back braces when 864 mm (34") or more in width.
- Breakaway feature for single post installation shall be the same as the breakaway feature shown for the two post installation.
- Tolerance for diameter of drilled holes in breakaway feature is ± 3 mm (1/8").

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

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REGISTERED PROFESSIONAL ENGINEER
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POST SPACING TABLE

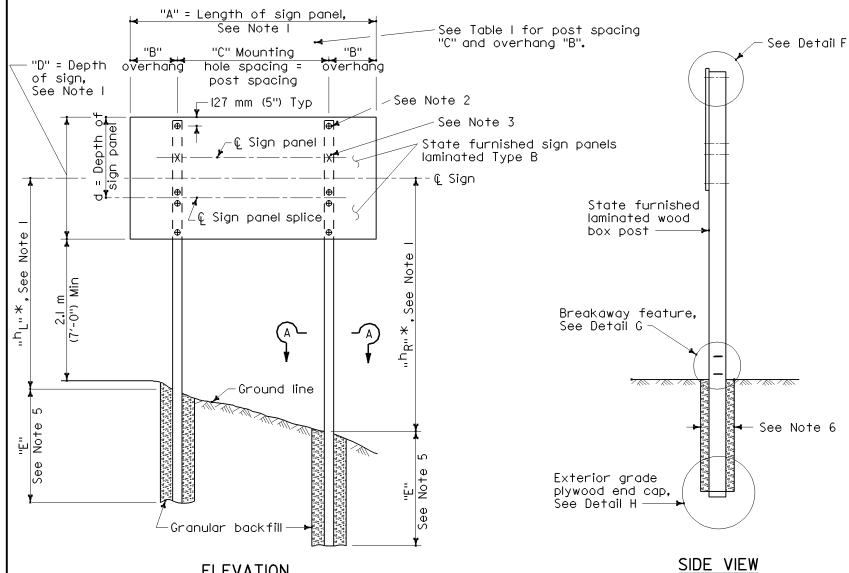
SIGN PANEL LENGTH "A"	SIGN PANEL OVERHANG "B"	POST SPACING "C"
1,420 m - 1,670 m (4'-8" - 5'-6")	175 mm - 300 mm (7" - 12")	1070 mm (42")
1,830 m & 1,980 m (6'-0" & 6'-6")	300 mm & 375 mm (12" & 15")	1230 mm (48")
2,135 m & 2,285 m (7'-0" & 7'-6")	375 mm & 450 mm (15" & 18")	1385 mm (54")
2,440 m (8'-0")	450 mm (18")	1540 mm (60")
2,590 m (8'-6")	500 mm (20")	1590 mm (62")
2,740 m (9'-0")	550 mm (22")	1640 mm (64")
2,890 m (9'-6")	575 mm (23")	1740 mm (68")
2,540 m (10'-0")	610 mm (24")	1320 mm (72")
3,200 m (10'-6")	610 mm (24")	1980 mm (78")
3,350 m, 3,500 m, 3,660 m (11'-0", 11'-6", 12'-0")	610 mm, 685 mm, 765 mm (24", 27", 30")	2130 mm (84")
3,810 m (12'-6")	765 mm (30")	2280 mm (90")
3,960 m (13'-0")	765 mm (30")	2430 mm (96")
4,110 m, 4,420 m (13'-6", 14'-6")	765 mm, 920 mm (30", 36")	2580 mm (102")
4,270 m, 4,420 m (14'-0", 14'-6")	840 mm, 915 mm (30", 36")	2590 mm (108")
4,720 m, 4,870 m (15'-6", 16'-0")	915 mm, 990 mm (36", 39")	2890 mm (114")
5,030 m (16'-6")	990 mm (39")	3050 mm (120")
5,180 m, 5,330 m (17'-0", 17'-6")	990 mm, 1065 mm (39", 42")	3200 mm (126")
5,490 m, 5,640 m (18'-0", 18'-6")	1065 mm, 1140 mm (42", 45")	3360 mm (132")
5,790 m (19'-0")	1140 mm (45")	3500 mm (138")
5,940 m, 6,000 m (19'-6", 20'-0")	1140 mm, 1220 mm (45", 48")	3660 mm (144")
6,250 m, 6,400 m (20'-6", 21'-0")	1140 mm, 1215 mm (48", 51")	3970 mm (156")
6,550 m (21'-6")	1215 mm (51")	4120 mm (162")
6,700 m, 6,850 m (22'-0", 22'-6")	1215 mm, 1290 mm (51", 54")	4270 mm (168")
7,010 m (23'-0")	1290 mm (54")	4430 mm (174")
7,160 m, 7,310 m (23'-6", 24'-0")	1290 mm, 1365 mm (54", 57")	4580 mm (180")

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**ROADSIDE SIGNS
WOOD POST
TYPICAL INSTALLATION
DETAILS NO.2**

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NO SCALE

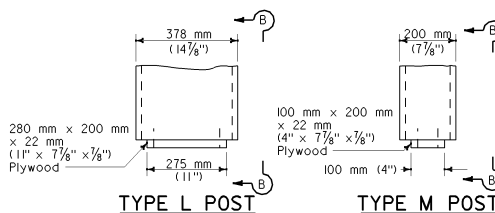
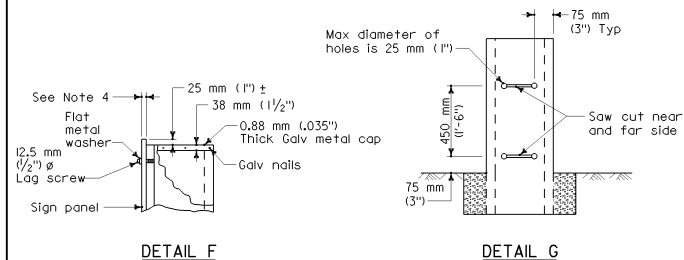
RS2



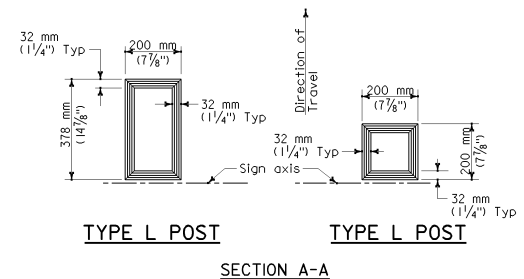
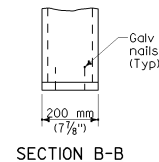
*Dimensions shown on project plans are for fabrications.
At time of installation, adjust these dimensions to provide a level sign approximately 2.1 m (7') above roadway shoulder.

"h _L " or "h _R "	TOTAL SIGN AREA				
	3.7 m ² (40 SOFT) up to 8.4 m ² (90 SOFT)	>8.4 m ² (90 SOFT) up to 13.0 m ² (140 SOFT)	>13.0 m ² (140 SOFT) up to 17.6 m ² (190 SOFT)	>17.6 m ² (190 SOFT) up to 22.3 m ² (240 SOFT)	>22.3 m ² (240 SOFT) up to 26.9 m ² (290 SOFT)
2.7 m to 4.0 m (9' to 13')	1.8 m (6')	2.0 m (6.5')	2.3 m (7.5')	2.6 m (8.5')	2.7 m (9')
4.0 m ± to 5.2 m (13' ± to 17')	1.8 m (6')	2.1 m (7')	2.4 m (8')	2.7 m (9')	3.0 m (10')
5.2 m ± to 6.4 m (17' ± to 21')	1.8 m (6')	2.3 m (7.5')	2.7 m (9')	2.7 m (9')	
6.4 m ± to 7.9 m (21' ± to 26')	2.1 m (7')	2.4 m (8')	2.7 m (9')		

TABLE 2
Minimum post embedment
"E" for Type L Post



GALV METAL CAP
State Furnished



STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
ROADSIDE SIGNS
LAMINATED WOOD BOX POST
TYPICAL INSTALLATION
DETAILS NO. 3

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NO SCALE

RS3

SIGN PANEL LENGTH (See Note 1)	SIGN PANEL OVERHANG	MOUNTING HOLE SPACING
"A"	"B"	"C"
2.44 m (8'-0")	457 mm (18")	1.52 m (5'-0")
2.74 m (9'-0")	559 mm (22")	1.63 m (5'-4")
3.05 m (10'-0")	610 mm (24")	1.83 m (6'-0")
3.35 m (11'-0")	610 mm (24")	2.13 m (7'-0")
3.66 m (12'-0")	762 mm (30")	2.13 m (7'-0")
3.96 m (13'-0")	762 mm (30")	2.44 m (8'-0")
4.27 m (14'-0")	762 mm (30")	2.74 m (9'-0")
4.57 m (15'-0")	914 mm (36")	2.74 m (9'-0")
4.88 m (16'-0")	991 mm (39")	2.90 m (9'-6")
5.18 m (17'-0")	991 mm (39")	3.20 m (10'-6")
5.49 m (18'-0")	1067 mm (42")	3.35 m (11'-0")
5.79 m (19'-0")	1143 mm (45")	3.51 m (11'-6")
6.10 m (20'-0")	1219 mm (48")	3.66 m (12'-0")
6.40 m (21'-0")	1295 mm (51")	3.81 m (12'-6")
6.71 m (22'-0")	1295 mm (51")	4.11 m (13'-6")
7.01 m (23'-0")	1372 mm (54")	4.27 m (14'-0")
7.32 m (24'-0")	1448 mm (57")	4.42 m (14'-6")

TABLE 1



GALV METAL CAP
State Furnished

NOTES:

- See Project Plans for:
Location of each sign.
Length of sign panel "A".
Depth of sign "D".
Height "h_L" and "h_R" of centerline of sign above ground line at each post.
Type of post, L and M.
See Standard Plans RS1 for other details.
- "e" Indicated location of 12.5 mm (1/2") lag screws and existing holes in panels. Lag screws are to be embedded at least 25 mm (1") into post using 8 mm (5/16") ϕ pilot holes.
- "x" indicates location of additional 12.5 mm (1/2") lag screws required when the depth of sign panel (d) and the length of sign panel (A) are as follows:

1524 mm (60")	5.18 m to 7.32 m (17'-0" to 24'-0")
1372 mm (54")	5.78 m to 7.32 m (19'-0" to 24'-0")
1219 mm (48")	6.40 m to 7.32 m (21'-0" to 24'-0")
1067 mm (42")	7.32 m (24'-0")
- State furnished Type B laminated sign panels are 29 mm (1 1/8") thick for sign lengths of 4.6 m (15') and less. Panel over 4.6 m (15') in length are 67 mm (2 5/8") thick.
- Embedment "E" for Type L post shall conform to the requirements in Table 2. Embedment for Type M posts shall be 1.8 m (6') minimum.
- Diameter of post holes for Type L posts shall be at least 75 mm (3"). Diameter of post holes for Type M posts shall be at least 600 mm (24").

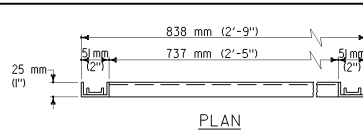
DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

July 1, 2002
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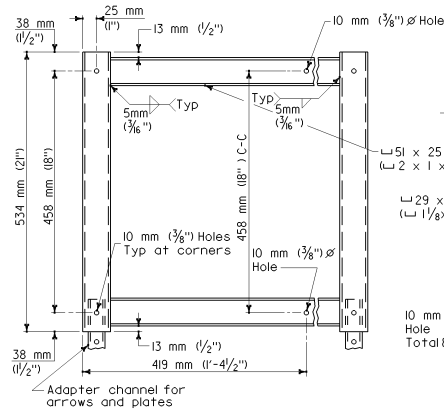
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PLAN

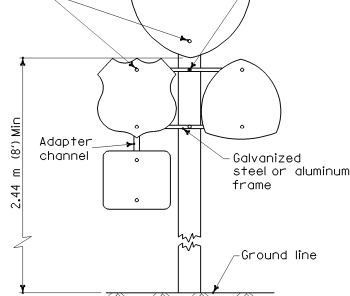


ELEVATION

GALVANIZED STEEL FRAME

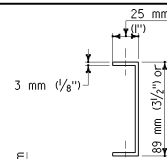
8 mm (5/16") \varnothing Hex head bolt with flat washers, lock washer and nut

8 mm (5/16") \varnothing Hex head bolt with flat washers, fiber washers, lock washer and nut



ELEVATION

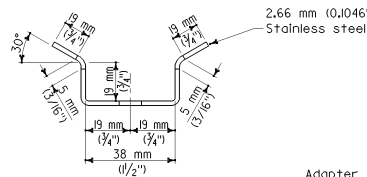
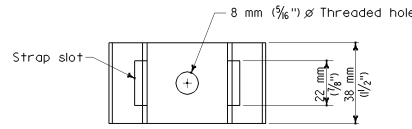
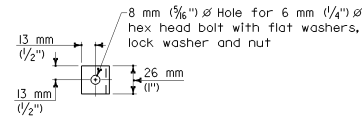
MULTIPLE SIGN INSTALLATION



PLAN

ELEVATION

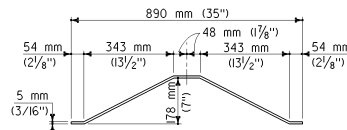
SPECIAL BRACKET



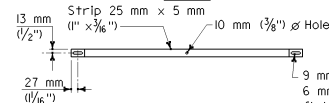
SADDLE BRACKET

NOTE:
Adapter channel rests inside frame channel when used.

ADAPTER CHANNEL

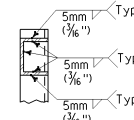


PLAN

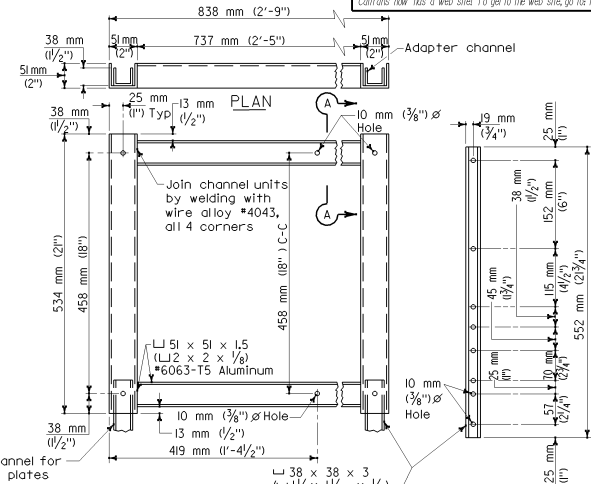


ELEVATION

BACK BRACE DETAILS



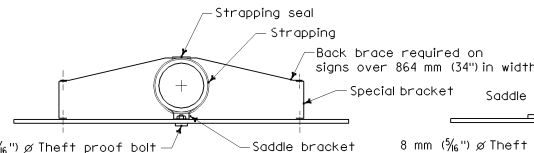
SECTION A-A



ELEVATION

ALUMINUM FRAME

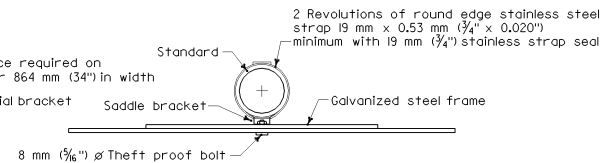
ADAPTER CHANNEL



SINGLE SIGN

INSTALLATION ON ELECTROLIER, SIGNAL STANDARD

OR SIGN STRUCTURE POST



MULTIPLE SIGN

ROADSIDE SIGNS
TYPICAL INSTALLATION
DETAILS NO. 4

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NO SCALE

RS4

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STATE OF CALIFORNIA

INSTRUCTIONS TO FABRICATOR

PROJECT PLANS SHOW:

1. Sign structure location.
2. Length of structure frame.
3. Panel size and locations on structure.
4. Walkway length for 2-post signs.
5. Post type and height to bottom of frame.
6. Base plate elevation.
7. Footing elevation or location of pile foundation.
8. Photoelectric cell location if required.

REFER TO THE FOLLOWING STANDARD PLANS FOR DETAILS NOT SHOWN ON PROJECT PLANS:

- S1 Instructions and Examples
- S2 Post Types II Thru VIII
- S3 Post Types I-S Thru VII-S
- S4 Structural Frame Members
- S5 Structural Frame Members
- S6 Structural Frame Details
- S7 Frame Junction Details
- S8A,B,C,D Sign Panel Mounting Details
- S9 Walkway Details No 1
- S10 Walkway Details No 2
- S11 Walkway Safety Railing Details
- S13 Pile Foundation
- ES-15A Mercury Sign Lighting Equipment
- ES-15C Sign Lighting Equipment

WALKWAY BRACKETS:

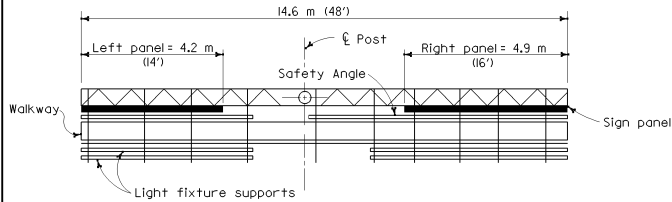
Space all walkway brackets maintaining uniform spacing where possible. Maximum spacing shall not exceed 1675 mm (66").

LIGHTING FIXTURE SUPPORTS:

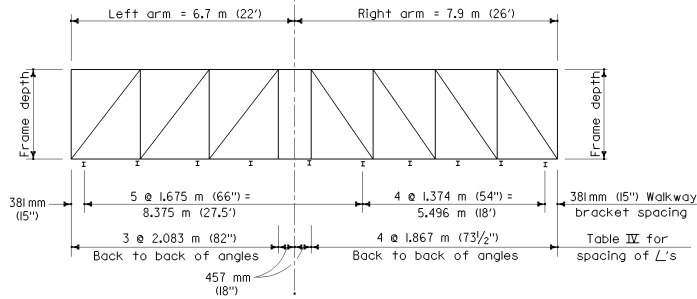
Where distance from walkway bracket to end of sign panel exceeds 406 mm (16"), extend lighting fixture supports to next walkway bracket. See Example No. 2.

WALKWAY AND SAFETY RAILING:

Walkway to be continuous for entire length of frame for single post signs. For 2 post signs see Project Plans. Safety railing to protect entire walkway, but continuous for no more than 3.35 m (11') in one unit.

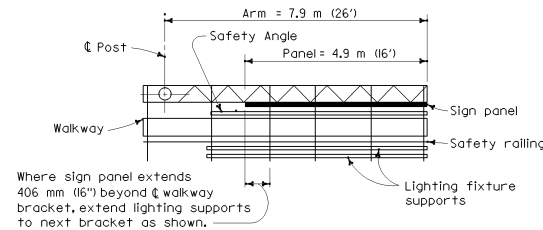


PLAN



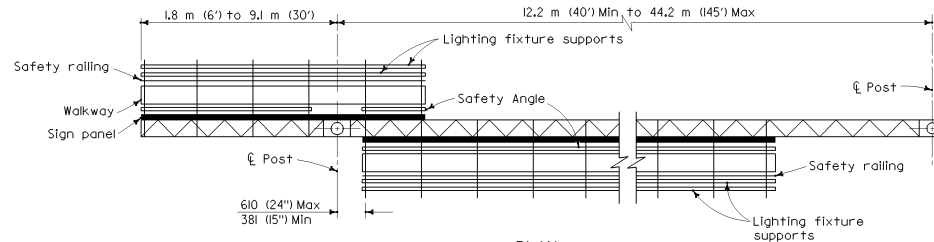
UNBALANCED SINGLE POST TYPE

Example No. 1



PLAN
CANTILEVER SINGLE
POST TYPE

Example No. 2



PLAN
TWO POST TYPE WITH CANTILEVER
(PART DOUBLE-FACED)

Example No. 3

NOTES

SPECIFICATIONS:

DESIGN: AASHTO Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, dated 1994.

CONSTRUCTION: Standard Specifications and the Special Provisions.

LOADING:

WIND LOADING:
Normal to face of sign: 1490 Pa (31psf)
Transverse to face of sign: 20% of normal force.

WALKWAY LOADING:
Dead load + 2.22 kN (500 lbs) concentrated live load.

UNIT STRESSES:

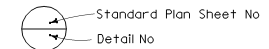
STRUCTURAL STEEL: $f_s = 138 \text{ MPa}$ (20,000 psi)
REINFORCED CONCRETE: $f_s = 138 \text{ MPa}$ (20,000 psi)
 $f_c = 8.3 \text{ MPa}$ (1,200 psi)
FOOTING SOIL PRESSURE: 120 kPa (2,500 psf) (spread footing)

MINIMUM CLEARANCE: Vertical roadway clearance 5.5 m (18').

WELDING: All welding continuous unless otherwise noted on the plans. All welding to be done in accordance with the Standard Specifications.

NOTE

Signs are shown and dimensioned looking in the direction of traffic. Double faced signs are shown and dimensioned looking ahead along stationing.



Standard Plan Sheet No

Detail No

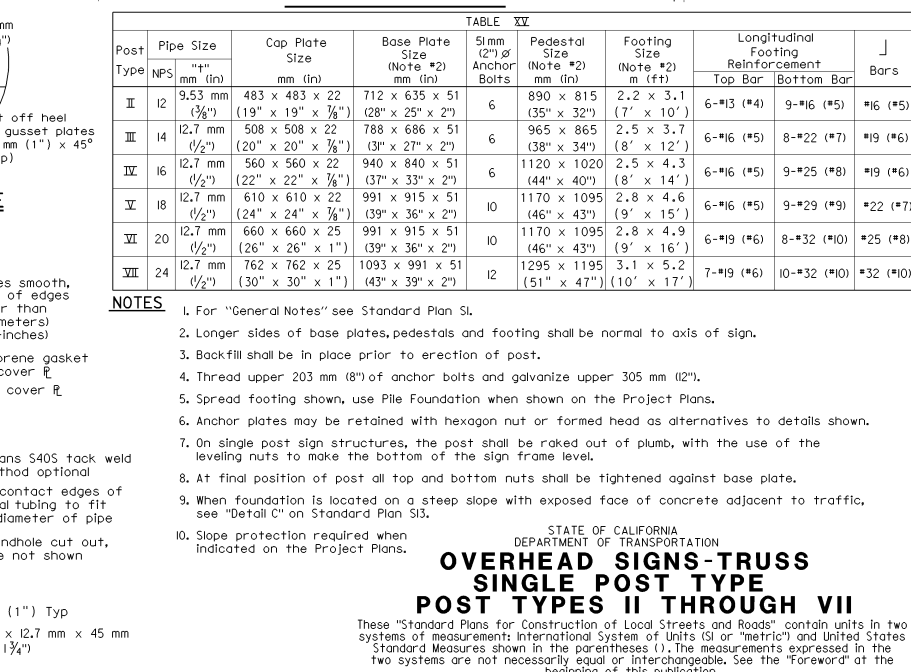
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
OVERHEAD SIGNS-TRUSS
INSTRUCTIONS AND EXAMPLES

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NO SCALE

S1

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
July 1, 2002					
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NOTES

1. For "General Notes" see Standard Plan S1.
2. Longer sides of base plates, pedestals and footings; shall be normal to axis of sign.
3. Backfill shall be in place prior to erection of post.
4. Thread upper 200 (8") of anchor bolts and galvanize over 300 mm (12").
5. Spread footing shown, use pile foundation when shown on the Project Plans.
6. Anchor plates may be retained with hex nut or formed head as an alternative to details shown.
7. When foundation is located on a steep slope with exposed face of concrete adjacent to traffic, see "Detail C" on Standard Plan S13.
8. Slope protection required when indicated on Project Plans.

DIST.	COUNTY	ROUTE	KILOMETER TOTAL	POST PROJECT	SHEET NO.	TOTAL SHEETS

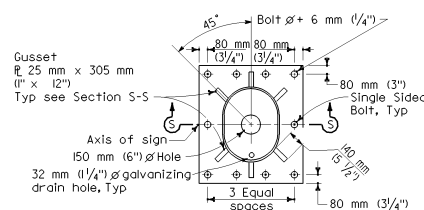
Jeffrey B. Woods
 REGISTERED CIVIL ENGINEER

July 1, 2002
 PLANS APPROVAL DATE

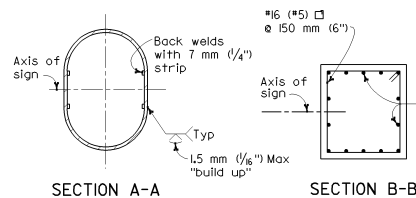
Jeffrey B. Woods
 REGISTERED PROFESSIONAL ENGINEER
 No. C41260
 Exp. 3-31-03
 CIVIL
 STATE OF CALIFORNIA

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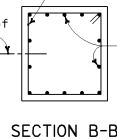
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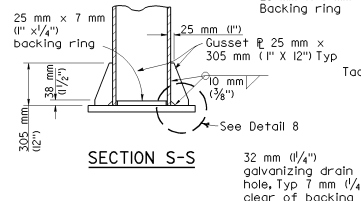
8 BOLT TYPE
TYPICAL BASE PLATE



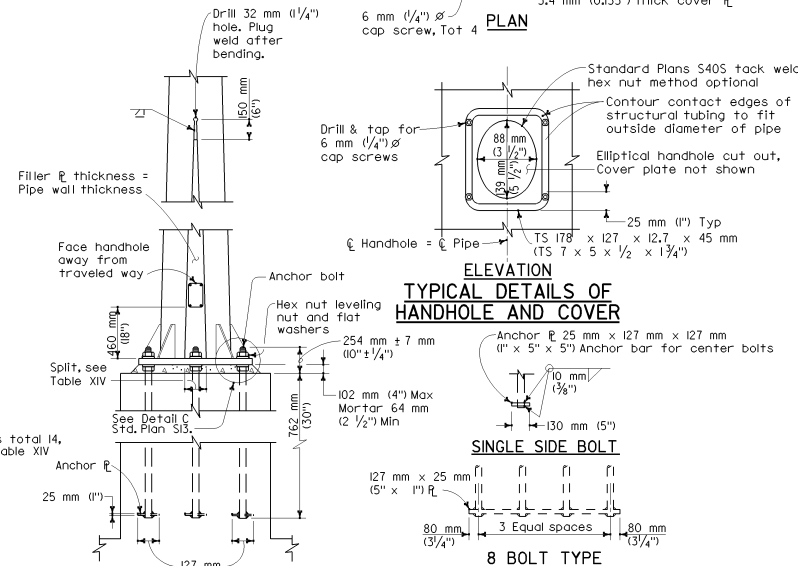
SECTION A-A



SECTION B-B



SECTION S-S



ELEVATION
TYPICAL DETAILS OF
HANDHOLE AND COVER

SINGLE SIDE BOLT

8 BOLT TYPE

ANCHORAGE DETAILS

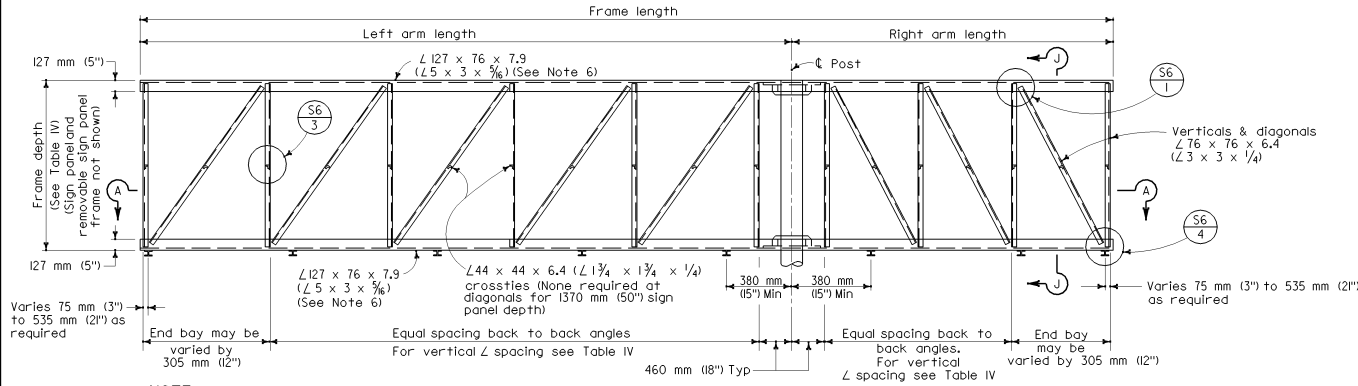
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGNS-TRUSS
TWO POST TYPE
POST TYPES I-S THROUGH VII-S

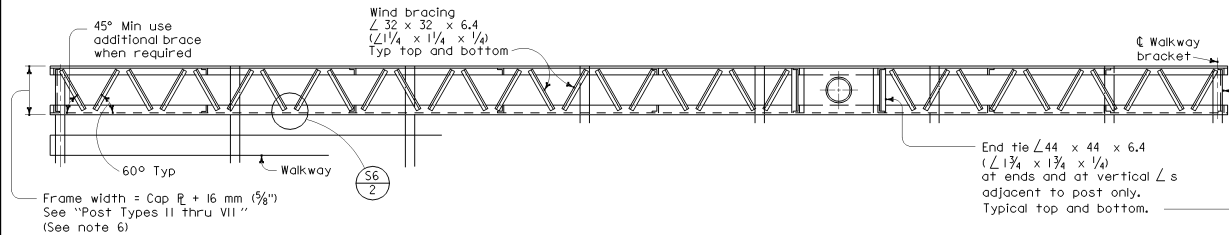
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NO SCALE

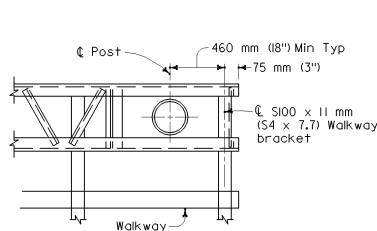
S 3



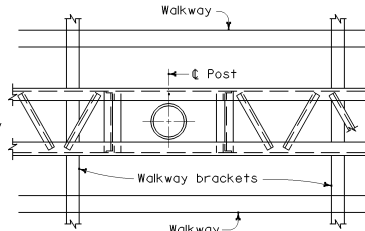
ELEVATION



SECTION A-A



PART PLAN OF CANTILEVER TYPE AT POST



PART PLAN OF DOUBLE FACED TYPE AT POST

NOTES

- For connection of frame to post see (S7)
- For walkway see (S9) and (S10)
- For walkway length see (S1)
- Minimum length of frame = 3.66 m (12')
- Maximum length of frame = 18.29 m (60')
- For arm lengths 10.67 m (35') to 12.19 m (40') and sign depths 2032 mm (80") thru 3048 mm (120"):
a. Use 127 mm (5") x 76 mm (3") x 12.7 mm (1/2") chord \angle s.
b. Frame width = Cap plate + 25.4 mm (1").
- Diagonal not required if arm length is equal to or less than shown in this column see table IV.

Standard Plan sheet number
Detail number

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
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Jeffrey B. Woody
REGISTERED CIVIL ENGINEER

July 1, 2002
PLANS APPROVAL DATE

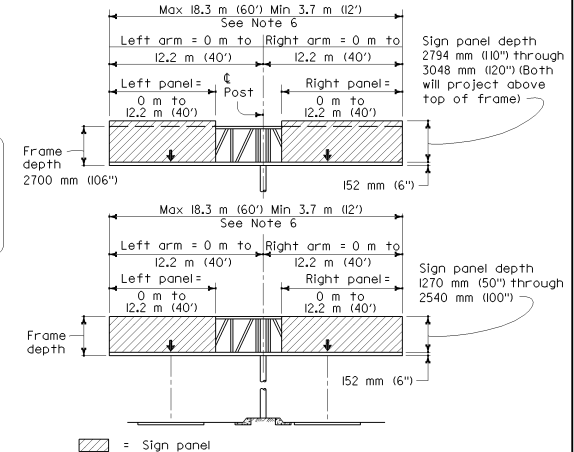
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Exp. 3-31-03
STATE OF CALIFORNIA

TABLE IV

Sign Panel Depth mm (in)	Frame Depth mm (in)	Maximum Vertical \angle Spacing mm (in)	See Note 7 mm (in)
1270 (50)	1423 (56)	1375 (54)	1220 (48)
1524 (60)	1675 (66)	1525 (60)	1220 (48)
1778 (70)	1931 (76)	1675 (66)	1220 (48)
2032 (80)	2185 (86)	1830 (72)	1525 (60)
2286 (90)	2439 (96)	2135 (84)	1525 (60)
2540 (100)	2693 (106)	2135 (84)	1830 (72)
2794 (110)	2693 (106)	2135 (84)	1830 (72)
3048 (120)	2693 (106)	2135 (84)	1830 (72)



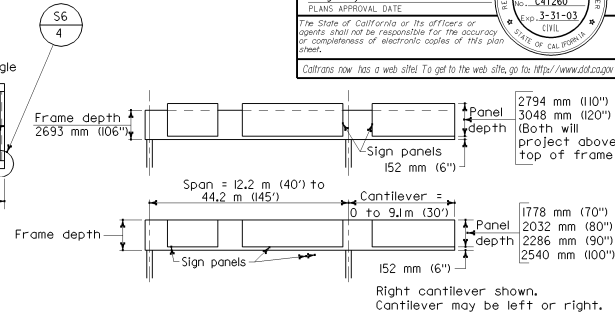
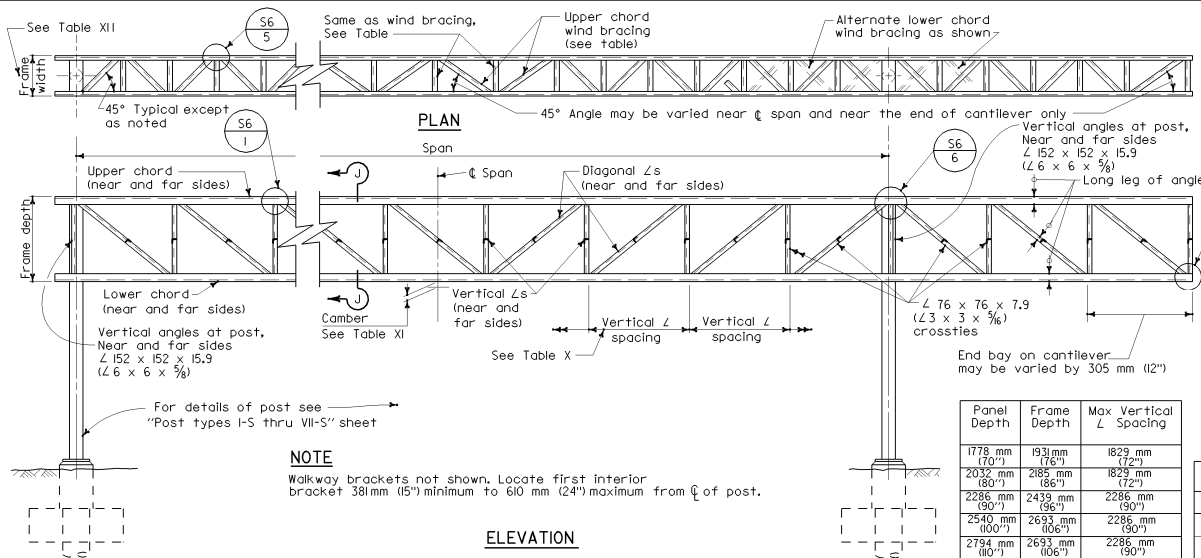
RANGE OF STRUCTURE SIZES

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**OVERHEAD SIGNS-TRUSS
SINGLE POST TYPE
STRUCTURAL FRAME MEMBERS**

These "Standard Plans for Construction of Local Streets and Roads" contain units in two systems of measurements: International System of Units (SI or "metric") and United States Standard Measures shown in the parentheses (). The measurements expressed in the two systems are not necessarily equal or interchangeable. See the "Foreword" at the beginning of this publication.

NO SCALE

S4



RANGE OF STRUCTURE SIZES

Panel Depth	Frame Depth	Max Vertical L Spacing
1778 mm (70")	1931 mm (76")	1829 mm (72")
2032 mm (80")	2085 mm (82")	1829 mm (72")
2286 mm (90")	2439 mm (96")	2286 mm (90")
2540 mm (100")	2693 mm (106")	2286 mm (90")
2794 mm (110")	2693 mm (106")	2286 mm (90")
3048 mm (120")	2693 mm (106")	2286 mm (90")

Camber for Fabrication At ℓ Span	
Span	Camber
12.9 m-15.24 m (40'-50')	27 mm (1 1/8")
15.25 m-30.48 m (50'-100')	54 mm (2 1/4")
30.49 m-44.20 m (100'-145')	83 mm (3 3/4")

Camber to approximate parabola. Camber of cantilever arm = ± 13 mm ($1/2$ ") for arms greater than 3.05 m (10')

TABLE X

TABLE XI

1778 mm (70") Panel Depth										2032 mm (80") Panel Depth										2286 mm (90") Panel Depth									
Span	Frame Width	Chord L's	Vertical L's	Diagonal L's	Wind Bracing L's	Frame Width	Chord L's	Vertical L's	Diagonal L's	Wind Bracing L's	Frame Width	Chord L's	Vertical L's	Diagonal L's	Wind Bracing L's	Frame Width	Chord L's	Vertical L's	Diagonal L's	Wind Bracing L's									
12.2m-15.4m (40'-50')	915 mm (36")	127mmx89mmx3.5mm (5"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	127mmx89mmx3.5mm (5"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	127mmx89mmx3.5mm (5"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	127mmx89mmx3.5mm (5"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")									
15.5m-18.5m (51'-60')	915 mm (36")	127mmx89mmx3.5mm (5"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	127mmx89mmx3.5mm (5"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	127mmx89mmx3.5mm (5"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	127mmx89mmx3.5mm (5"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")									
18.6m-21.5m (61'-70')	915 mm (36")	127mmx89mmx3.5mm (5"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	127mmx89mmx3.5mm (5"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	127mmx89mmx3.5mm (5"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	127mmx89mmx3.5mm (5"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")									
21.6m-24.6m (71'-80')	915 mm (36")	152mmx102mmx2.1mm (6"x4"x1/2")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	152mmx102mmx2.1mm (6"x4"x1/2")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	152mmx102mmx2.1mm (6"x4"x1/2")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	152mmx102mmx2.1mm (6"x4"x1/2")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")									
24.7m-27.6m (81'-90')	915 mm (36")	152mmx102mmx2.1mm (6"x4"x1/2")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	152mmx102mmx2.1mm (6"x4"x1/2")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	152mmx102mmx2.1mm (6"x4"x1/2")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	152mmx102mmx2.1mm (6"x4"x1/2")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")									
27.7m-30.7m (91'-100')	915 mm (36")	152mmx102mmx2.1mm (6"x4"x1/2")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	152mmx102mmx2.1mm (6"x4"x1/2")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	152mmx102mmx2.1mm (6"x4"x1/2")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	152mmx102mmx2.1mm (6"x4"x1/2")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")									
30.8m-33.7m (101'-110')	915 mm (36")	203mmx102mmx19.0mm (8"x4"x3/4")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	203mmx102mmx19.0mm (8"x4"x3/4")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	203mmx102mmx19.0mm (8"x4"x3/4")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	203mmx102mmx19.0mm (8"x4"x3/4")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")									
33.8m-36.8m (111'-120')	915 mm (36")	203mmx102mmx19.0mm (8"x4"x3/4")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	203mmx102mmx19.0mm (8"x4"x3/4")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	203mmx102mmx19.0mm (8"x4"x3/4")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	203mmx102mmx19.0mm (8"x4"x3/4")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")									
36.9m-39.8m (121'-130')	915 mm (36")	203mmx102mmx19.0mm (8"x4"x3/4")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	203mmx102mmx19.0mm (8"x4"x3/4")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	203mmx102mmx19.0mm (8"x4"x3/4")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	203mmx102mmx19.0mm (8"x4"x3/4")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")									
39.9m-44.2m (131'-145')	915 mm (36")	203mmx102mmx19.0mm (8"x4"x3/4")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	203mmx102mmx19.0mm (8"x4"x3/4")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	203mmx102mmx19.0mm (8"x4"x3/4")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	203mmx102mmx19.0mm (8"x4"x3/4")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")									
2540 mm (100") Panel Depth										2794 mm (110") and 3048 mm (120") Panel Depth																			
Span	Frame Width	Chord L's	Vertical L's	Diagonal L's	Wind Bracing L's	Frame Width	Chord L's	Vertical L's	Diagonal L's	Wind Bracing L's	Frame Width	Chord L's	Vertical L's	Diagonal L's	Wind Bracing L's	NOTES													
12.2m-15.4m (40'-50')	915 mm (36")	127mmx89mmx3.5mm (5"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	127mmx89mmx3.5mm (5"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	127mmx89mmx3.5mm (5"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	Frame widths shown are nominal. These widths may be varied by 6 mm (1/4") to standardize fabrication methods.													
15.5m-18.5m (51'-60')	915 mm (36")	127mmx89mmx3.5mm (5"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	127mmx89mmx3.5mm (5"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	127mmx89mmx3.5mm (5"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")														
18.6m-21.5m (61'-70')	915 mm (36")	127mmx89mmx3.5mm (5"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	127mmx89mmx3.5mm (5"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	127mmx89mmx3.5mm (5"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")														
21.6m-24.6m (71'-80')	915 mm (36")	152mmx102mmx2.1mm (6"x4"x1/2")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	152mmx102mmx2.1mm (6"x4"x1/2")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	152mmx102mmx2.1mm (6"x4"x1/2")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")														
24.7m-27.6m (81'-90')	915 mm (36")	152mmx102mmx2.1mm (6"x4"x1/2")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	152mmx102mmx2.1mm (6"x4"x1/2")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	152mmx102mmx2.1mm (6"x4"x1/2")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")														
27.7m-30.7m (91'-100')	915 mm (36")	152mmx102mmx2.1mm (6"x4"x1/2")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	152mmx102mmx2.1mm (6"x4"x1/2")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	152mmx102mmx2.1mm (6"x4"x1/2")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")														
30.8m-33.7m (101'-110')	915 mm (36")	203mmx102mmx19.0mm (8"x4"x3/4")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	203mmx102mmx19.0mm (8"x4"x3/4")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	203mmx102mmx19.0mm (8"x4"x3/4")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")														
33.8m-36.8m (111'-120')	915 mm (36")	203mmx102mmx19.0mm (8"x4"x3/4")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	203mmx102mmx19.0mm (8"x4"x3/4")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	203mmx102mmx19.0mm (8"x4"x3/4")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")														
36.9m-39.8m (121'-130')	915 mm (36")	203mmx102mmx19.0mm (8"x4"x3/4")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	203mmx102mmx19.0mm (8"x4"x3/4")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	203mmx102mmx19.0mm (8"x4"x3/4")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")														
39.9m-44.2m (131'-145')	915 mm (36")	203mmx102mmx19.0mm (8"x4"x3/4")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	203mmx102mmx19.0mm (8"x4"x3/4")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")	915 mm (36")	203mmx102mmx19.0mm (8"x4"x3/4")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	89mmx89mmx1.9mm (3 1/2"x3 1/2"x3/8")	64mmx64mmx6.4mm (2 1/2"x2 1/2"x1/4")														
																STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION OVERHEAD SIGNS-TRUSS TWO POST TYPE STRUCTURAL FRAME MEMBERS These "Standard Plans for Construction of Local Streets and Roads" contain units systems of measurement: International System of Units (SI or "metric") and United Standard Measures shown in the parentheses (). The measurements expressed in two systems are not necessarily equal or interchangeable. See the "Forward"													

TABLE XII

NOTES

Frame widths shown are nominal. These widths may be varied by 6 mm ($1/4$ ") to standardize fabrication methods.

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION OVERHEAD SIGNS-TRUSS TWO POST TYPE STRUCTURAL FRAME MEMBERS

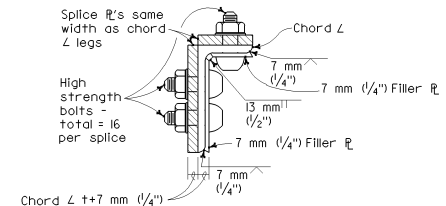
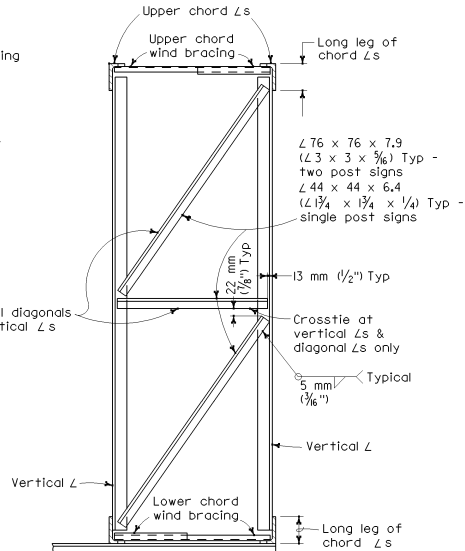
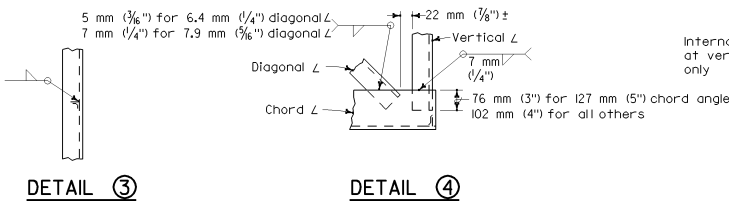
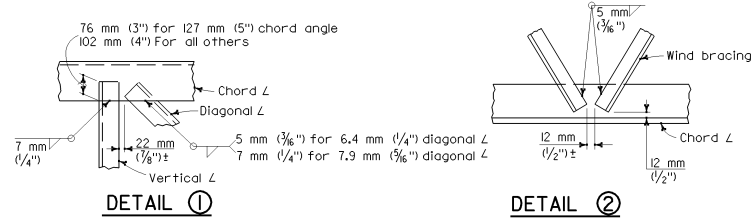
These "Standard Plans for Construction of Local Streets and Roads" contain units in two systems of measurement: International System of Units (SI or "metric") and United States Standard Measures shown in the parentheses ("). The measurements expressed in the two systems are not necessarily equal or interchangeable. See the "Foreword" at the beginning of this publication.

NO SCALE

S5

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

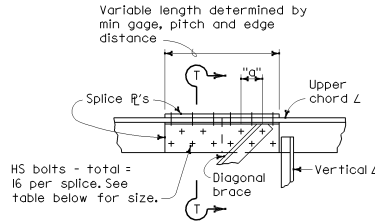
July 1, 2002
 PLANS APPROVAL DATE
 The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.
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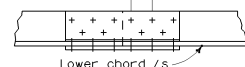
BOLTED CHORD SPLICE			
TWO POST SIGNS			
Chord L	Nominal Bolt Diameter	"a" Min	
127 mm x 89 mm x 9.5 mm (5" x 3 1/2" x 3/8")	M20 x 2.5 (3/4")	64 mm (2 1/2")	
152 mm x 102 mm x 12.7 mm (6" x 4" x 1/2")	M22 x 2.5 (7/8")	76 mm (3")	
178 mm x 102 mm x 19.0 mm (7" x 4" x 3/4")	M27 x 3 (1")	89 mm (3 1/2")	
203 mm x 102 mm x 19.0 mm (8" x 4" x 3/4")	M27 x 3 (1 1/8")	89 mm (3 1/2")	
203 mm x 102 mm x 19.0 mm (8" x 4" x 3/4")	M30 x 3.5 (1 1/4")	96 mm (3 3/4")	
203 mm x 102 mm x 19.0 mm (8" x 4" x 3/4")	M30 x 3.5 (1 1/4")	96 mm (3 3/4")	
SINGLE POST SIGNS			
Chord L	Nominal Bolt Diameter	"a" Min	
127 mm x 76 mm x 7.9 mm (5" x 3" x 5/16")	M20 x 2.5 (3/4")	64 mm (2 1/2")	
127 mm x 76 mm x 12.7 mm (5" x 3" x 1/2")	M20 x 2.5 (3/4")	64 mm (2 1/2")	

TYPICAL SECTION J-J

NOTE
Diagonal Ls in plane of truss not shown. Bracing shown is at all vertical Ls of truss.



SPLICE WITH DIAGONAL ANGLE

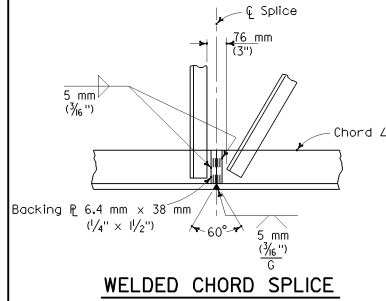
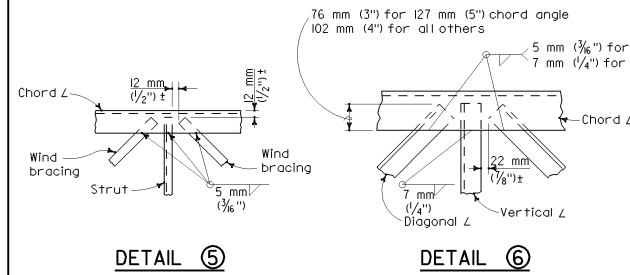


BOLTED CHORD SPLICE

SPLICE NOTES

Location of Splices:
The splice shall be located so as not to interfere with mounting the walkway brackets or the clip angles for the removable sign panel frame. The wind bracing in the area of the bolted chord splice shall be bolted to the chord angles with a 10 mm (3/8") HS bolt, nut, 2 cut washers and lock washer.

Filler R:
The plates welded to the angle legs on the inside shall be welded before punching the bolt holes. They shall be the same length as the cover plates. The plates are not necessary on the single post signs if the splice is located over 1/3 of the cantilever length from the post. Alternative splice details may be used if approved by the Engineer.



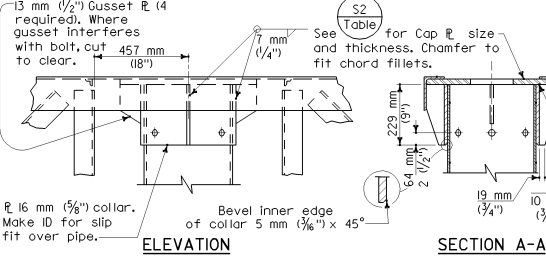
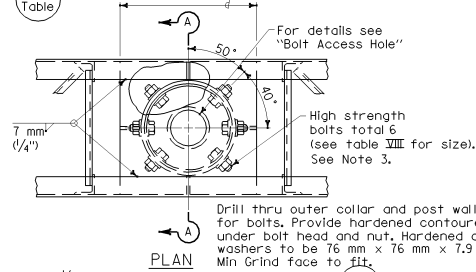
STATE OF CALIFORNIA
 DEPARTMENT OF TRANSPORTATION
**OVERHEAD SIGNS-TRUSS
 STRUCTURAL FRAME DETAILS**

These "Standard Plans for Construction of Local Streets and Roads" contain units in two systems of measurement: International System of Units (SI or "metric") and United States Standard Measures shown in the parentheses (). The measurements expressed in the two systems are not necessarily equal or interchangeable. See the "Foreword" at the beginning of this publication.

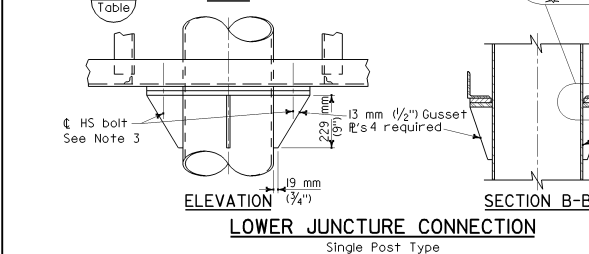
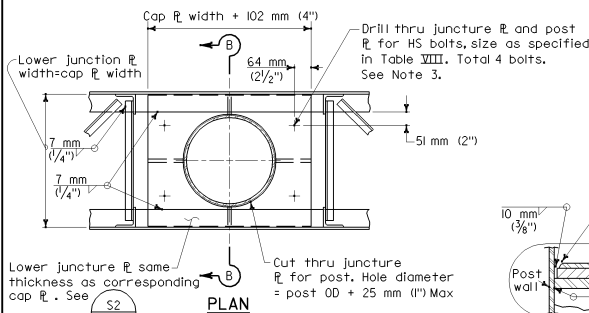
NO SCALE

S6

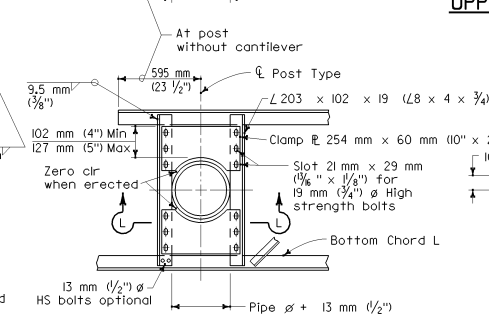
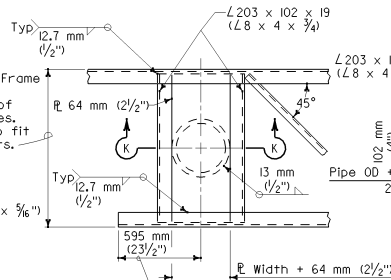
See S2 for cap R dimensions.



UPPER JUNCTURE CONNECTION
Single Post Type



LOWER JUNCTURE CONNECTION
Single Post Type

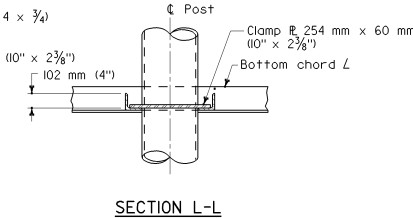


LOWER CHORD CONNECTION TO POST
Two Post Type

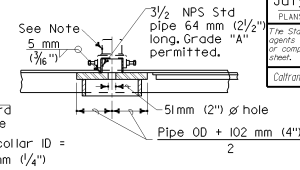
SECTION K-K
Without photoelectric control unit
With photoelectric control unit

SECTION K-K
With photoelectric control unit

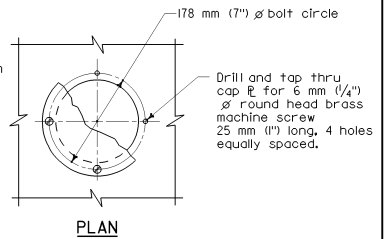
UPPER CHORD CONNECTION TO POST
Two Post Type



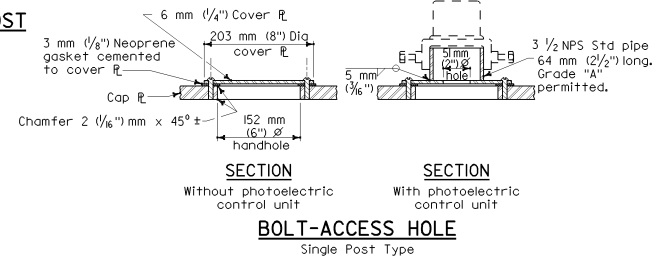
SECTION L-L



SECTION K-K
With photoelectric control unit



PLAN



SECTION
Without photoelectric control unit
With photoelectric control unit

BOLT-ACCESS HOLE
Single Post Type

Post Type	Bolt Size
II	M22 (7/8")
III	M22 (7/8")
IV	M27 (1 1/8")
V	M27 (1 1/8")
VI	M27 (1 1/8")
VII	M30 (1 1/4")
VIII	M30 (1 1/4")

NOTES (Single Post Type)

- In all cases, truss shall be supported at lower junction connection. Bearing surface shall be finished true.
- Post to truss connections shall be fitted in shop, systems of measurement: International System of Units (SI or "metric") and United States Standard Measures shown in the parentheses (1). The measurements expressed in the two systems are not necessarily equal or interchangeable. See the "Foreword" at the beginning of this publication.
- High strength bolts noted to be wrench tightened. Torque requirements are waived.

NO SCALE

S7

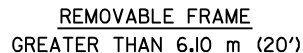
DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

July 1, 2002
PLANS APPROVAL DATE

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REGISTERED CIVIL ENGINEER
Jeffrey S. Woody
No. C41260
Exp. 3-31-03
STATE OF CALIFORNIA



Sign Length	Left Section	Right Section
6.71 m (22')	3.66 m (12')	3.05 m (10')
7.32 m (24')	3.66 m (12')	3.66 m (12')
7.93 m (26')	3.66 m (12')	4.27 m (14')
8.54 m (28')	4.88 m (16')	3.66 m (12')
9.15 m (30')	4.88 m (16')	4.27 m (14')
9.76 m (32')	4.88 m (16')	4.88 m (16')
10.37 m (34')	4.88 m (16')	5.49 m (18')
10.98 m (36')	6.10 m (20')	4.88 m (16')
11.59 m (38')	6.10 m (20')	5.49 m (18')
12.20 m (40')	6.10 m (20')	6.10 m (20')

Frames for signs greater than 6.0 m (20') in length shall be fabricated in two sections with left section a multiple of 1220 (48") in length. See table above.

Sections shall be hoisted into place individually and bolted together as per detail (U) prior to tightening of mounting clip bolts.

Bolting two sections together and hoisting simultaneously will not be permitted.



Technical drawing of the front panel assembly, showing top and side views with dimensions and labels.

Top View Dimensions:

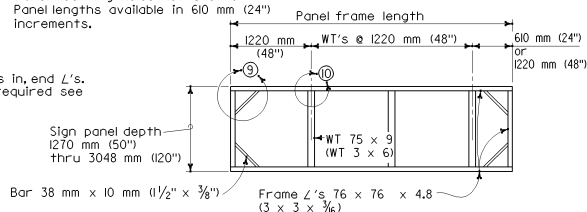
- Overall width: 388 mm (15 1/2") to 500 mm (20") center
- Panel mounting holes: 32 mm (1 1/4") from each side edge.
- Left frame and Right frame labels.
- 13 mm (1/2") \times Hex head bolt & nut with 2 flat washers.

Side View Dimensions:

- Panel thickness: 16 mm.
- Mounting hole diameter: 16 mm.
- Labels: Mo, Ta, Std.

Panel Depth	No. of slots
1270 mm (50")	2
1778 mm (70")	3
2032 mm (80") & 2286 mm (90")	4
2540 mm (100") & 2794 mm (110")	5
3048 mm (120")	6

Panel mounting holes not shown.
Panel lengths available in 610 mm
increments.



1. Frames shall be all-welded construction.
2. Panel mounting holes shall be drilled by template. Sign panel may be considered a template.
3. Drilled and tapped holes 6.34 mm (1/4") may be used where interference due to welds or structural members is encountered.
4. WTT5 x 9 (WT3 x 6) shall be flush with faces of frame angles.
5. Mounting clip angles shall be located such as to allow the top and bottom frame angles of the removable sign panel to lie on a straight horizontal line.
6. Holes for mounting removable sign panel frame may be slopped 25 mm (1") maximum parallel to the axis of the sign.
7. WTT5 x 9 (WT3 x 6) may be crimped at ends to join frame angles. Fillet weld all around.

DETAIL 10

DETAIL 9

mm (1/2") Hex head bolt & nut. Provide washer & lockwasher top & bottom.

44 mm (1 3/4")

Top chord member

Removable frame

Face of sign panel

44 mm (1 3/4")

44 mm (1 3/4")

44 mm (1 3/4")

44 mm (1 3/4")

Bottom chord member

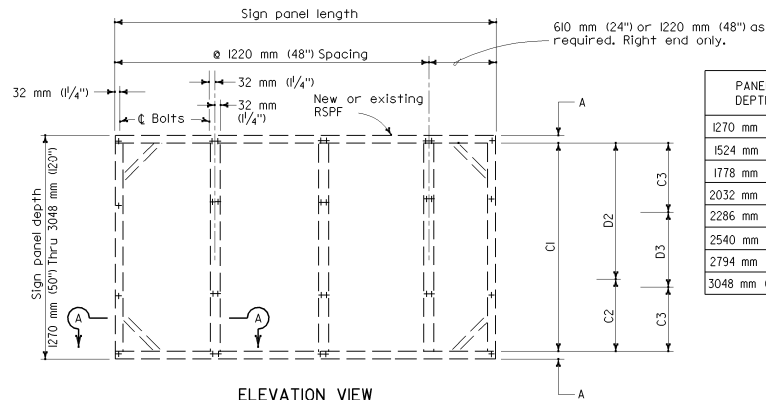
Shim between frame and clip L as required

L76 x 64 x 9.5 (4.3 x 2 1/2 x 3/8) (top and bottom)

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**OVERHEAD SIGNS
STEEL FRAMES
VARIABLE SIGN PANEL FRAMES**

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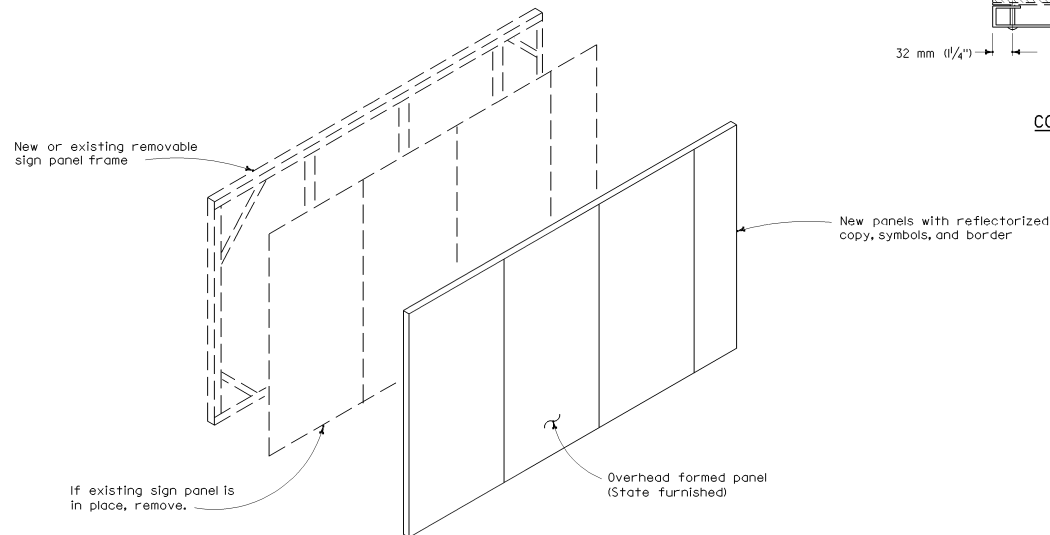
S8A



ELEVATION VIEW
NEW OR EXISTING REMOVABLE SIGN PANEL FRAME
MOUNTING HOLE SPACING

NOTE

Sign panel mounting holes 13 mm ($\frac{1}{2}$ ") ϕ maximum for 10 mm ($\frac{3}{8}$ ") ϕ bolts.

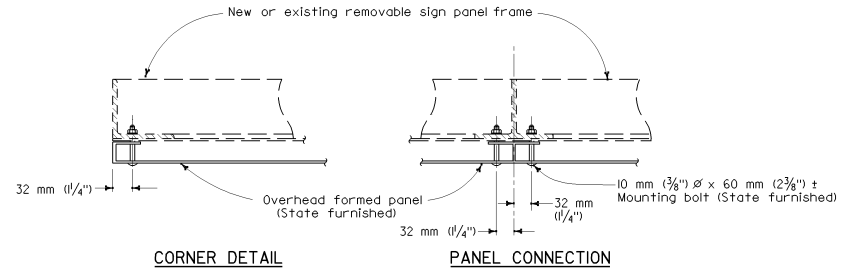


NOTE

The Contractor shall verify all dependent dimensions in the field before ordering or fabricating any material.

PANEL DEPTH	A	MOUNTING BOLT SPACING					
		1 Space		2 Space		3 Space	
		C1	C2	D2	C3	D3	C3
1270 mm (50")	32 mm (1 1/4")	1207 mm (47 1/2")					
1524 mm (60")			730 mm (28 3/4")	730 mm (28 3/4")			
1778 mm (70")			1238 mm (48 3/4")	476 mm (18 3/4")			
2032 mm (80")			984 mm (38 3/4")	984 mm (38 3/4")			
2286 mm (90")			984 mm (38 3/4")	1238 mm (48 3/4")			
2540 mm (100")			1238 mm (48 3/4")	1238 mm (48 3/4")			
2794 mm (110")					984 mm (38 3/4")	762 mm (30")	984 mm (38 3/4")
3048 mm (120")					1238 mm (48 3/4")	508 mm (20")	1238 mm (48 3/4")

TABLE 1



CORNER DETAIL

SECTION A-A

NOTES

- When constructing a new frame:
(1) Refer to Standard Plan Sheet S8A for structural details.
(2) Sign panels shall be considered as a template for drilling holes for mounting bolts.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
OVERHEAD SIGNS
REMOVABLE SIGN PANEL FRAMES
OVERHEAD FORMED PANEL
MOUNTING DETAILS

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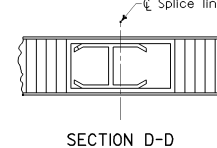
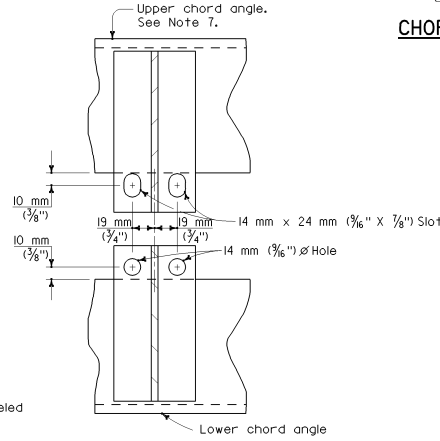
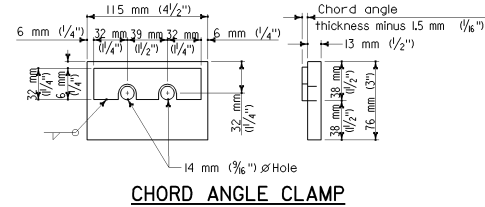
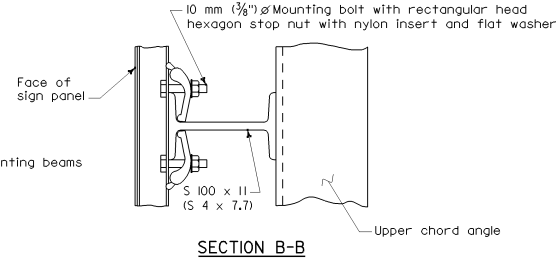
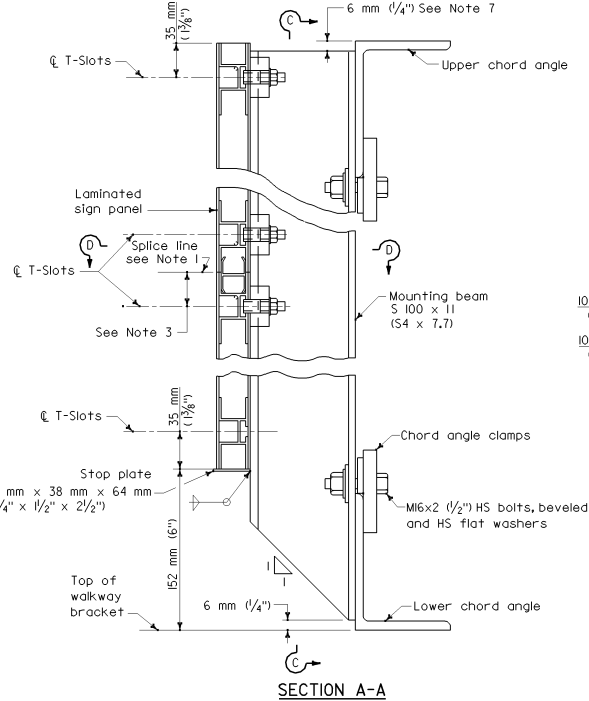
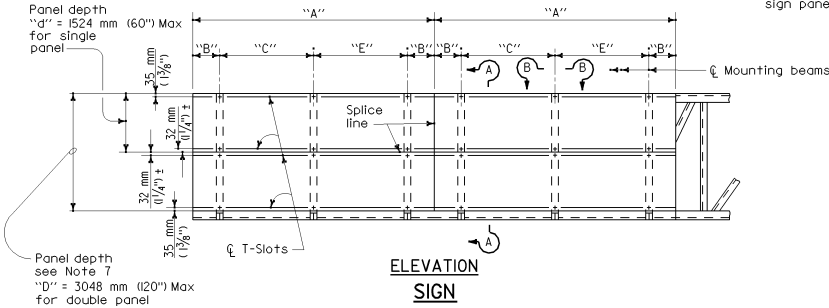
NO SCALE

S8B

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER
Jeffrey B. Woody
No. C41260
PLANS APPROVAL DATE
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DIST	COUNTY	ROUTE	KILOMETER TOTAL PROJECT	POST NO.	SHEET NO.	TOTAL SHEETS

Jeffrey S. Woody
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MOUNTING BEAM SPACING TABLE

SIGN PANEL LENGTH *	NUMBER MOUNTING BEAMS	SIGN PANEL OVERHANG	MOUNTING BEAM SPACING	
"A"		"B"	"C"	"E"
1.52 m (5')	2	229 mm (9")	1.02 m (3 1/2')	
1.83 m (6')	2	305 mm (12")	1.22 m (4')	
2.13 m (7')	2	381 mm (15")	1.37 m (4 1/2')	
2.44 m (8')	2	458 mm (18")	1.52 m (5')	
2.74 m (9')	2	559 mm (22")	1.63 m (5 1/2')	
3.05 m (10')	2	610 mm (24")	1.83 m (6')	
3.35 m (11')	2	610 mm (24")	2.13 m (7')	
3.66 m (12')	2	762 mm (30")	2.13 m (7')	
3.96 m (13')	2	762 mm (30")	2.44 m (8')	
4.27 m (14')	2	762 mm (30")	2.74 m (9')	
4.57 m (15')	2	915 mm (36")	2.74 m (9')	
4.88 m (16')	3	153 mm (6")	2.29 m (7 1/2')	2.29 m (7 1/2')
5.18 m (17')	3	305 mm (12")	2.29 m (7 1/2')	2.29 m (7 1/2')
5.49 m (18')	3	305 mm (12")	2.44 m (8')	2.44 m (8')
5.79 m (19')	3	305 mm (12")	2.59 m (8 1/2')	2.59 m (8 1/2')
6.10 m (20')	3	458 mm (18")	2.59 m (8 1/2')	2.59 m (8 1/2')
6.40 m (21')	3	458 mm (18")	2.74 m (9')	2.74 m (9')
6.71 m (22')	3	610 mm (24")	2.74 m (9')	2.74 m (9')
7.01 m (23')	3	762 mm (30")	2.74 m (9')	2.74 m (9')
7.32 m (24')	3	915 mm (36")	2.74 m (9')	2.74 m (9')

* Signs longer than 7.32 meters (24') are fabricated and mounted as adjoining single panels.

NOTES

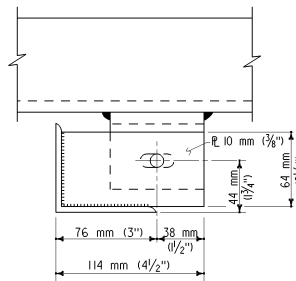
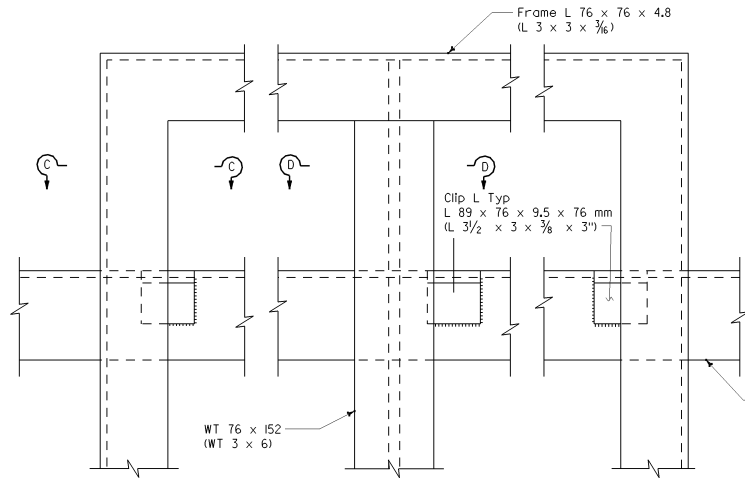
- The size and number of individual sign panel plus the location of splice line is dependent on the sign panel manufacturer.
- Mounting bolts are required on each side of the horizontal splice lines.
- Dimension varies from panel to panel. Average value approximate 32 mm (1 1/4").
- Torque aluminum sign panel mounting bolts to 12 Nm (100 inch-pounds).
- Chord angle clamp to be galvanized after fabrication.
- The Contractor shall verify all dependent dimensions in the field before ordering or fabricating any material.
- 2750 mm (110") and 3000 mm (120") sign panel along with the mounting beams will project above the top chord truss member 254 mm (10") and 508 mm (20") respectively. Attachments details shall be the same.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**OVERHEAD SIGNS-TRUSS
SIGN MOUNTING DETAILS
LAMINATED PANEL-TYPE A**

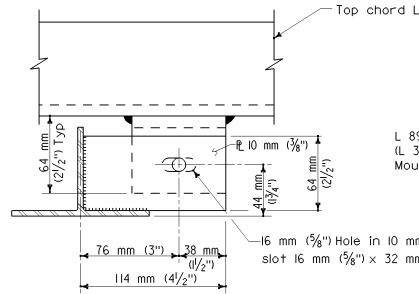
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NO SCALE

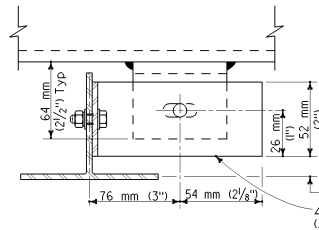
S8C



SECTION C-C



SECTION D-D

ALTERNATIVE CONNECTION AT TOP CHORD**BOLTED ALTERNATIVE CONNECTION AT TOP CHORD**

For details not shown, see Sections C-C and D-D.

NOTES

1. For steel Removable Sign Panel Frame details see Standard Plan S8A.
2. Minimum fillet weld is 7 mm (1/4") for clip angles welded to chord member of truss.
3. Maximum spacing of bottom clip angle is 1676 mm (66").
4. Top clips required for each vertical member or Removable Sign Panel Frame.

Frame L 76 x 76 x 4.8
(L 3 x 3 x 3/16)
(top and bottom)Slot 16 mm x 32 mm
(5/8" x 1 1/4")
in clip angle

Top chord L

Top chord L

L 89 x 64 x 9.5
(L 3 1/2 x 2 1/2 x 3/8)
Mounting clip16 mm (5/8") Hole in 10 mm (3/8") R Typ
slot 16 mm (5/8") x 32 mm (1 1/4") in clip L

Sign panel

WT 75 x 9
(WT 3 x 6)Clip L 89 x 76 x 9.5 x 100 mm
(L 3 1/2 x 3 x 3/8 x 4")

Top chord angle

10 mm (3/8")

13 mm (1/2") Hex head bolt,
nut flat and lock washer

Bottom chord angle

SECTION B-B

STEEL REMOVABLE SIGN PANEL FRAMESFrame L 76 x 76 x 4.8
(L 3 x 3 x 3/16)
(top and bottom)

13 mm (1/2")

64 mm (2 1/2")

64 mm (2 1/2")

64 mm (2 1/2")

76 mm (3")

64 mm (2 1/2")

ELEVATION VIEW

STEEL REMOVABLE SIGN PANEL FRAMES

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**OVERHEAD SIGNS-TRUSS
REMOVABLE SIGN PANEL FRAMES
2794 mm (110") AND 3048 mm (120")
SIGN PANELS**

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NO SCALE

S8D

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DIST	COUNTY	ROUTE	KILOMETER POST	SHEET TOTAL

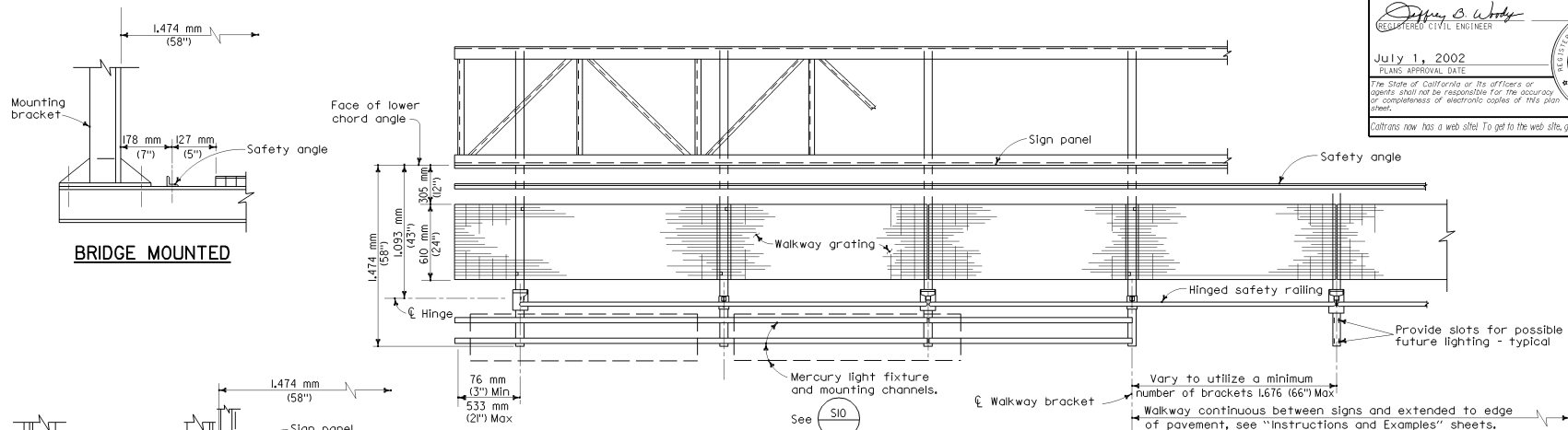
DIST. COUNTY ROUTE KILOMETER POST SHEET TOTAL
 TOTAL PROJECT NO. SHEETS

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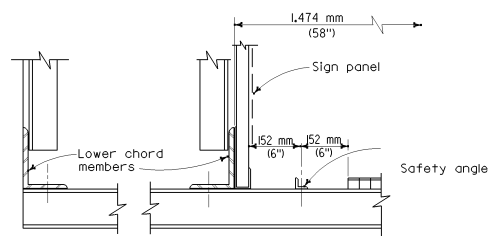
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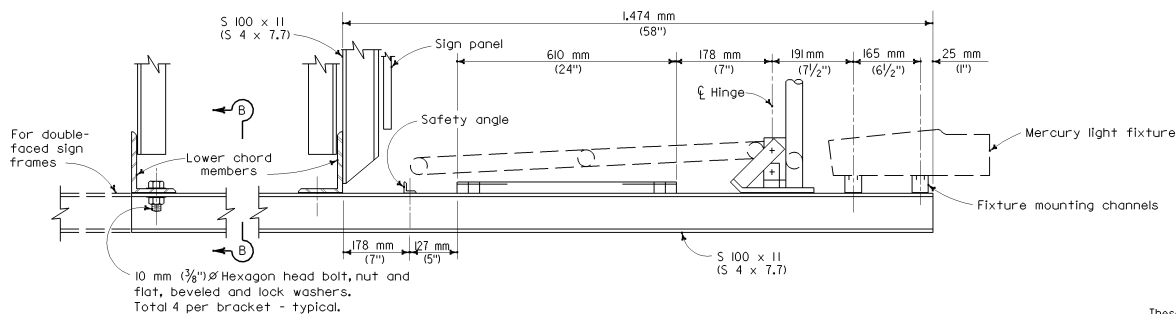
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WALKWAY PLAN

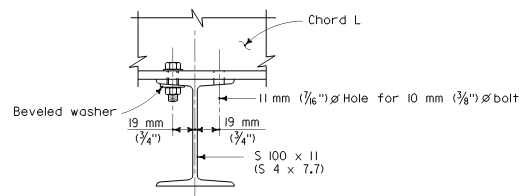


BOX BEAM CLOSED TRUSS



TRUSS

TYPICAL WALKWAY SECTION



NOTE

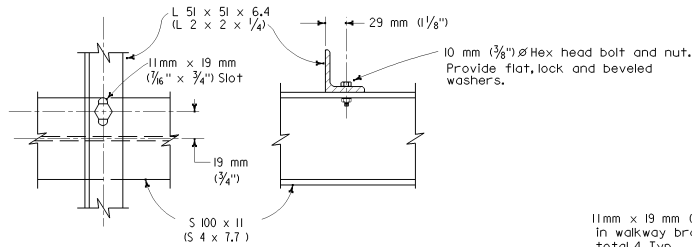
For spacing of lighting fixtures, see Standard Plan ES-29.

STATE OF CALIFORNIA
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**OVERHEAD SIGNS
 WALKWAY DETAILS NO. 1**

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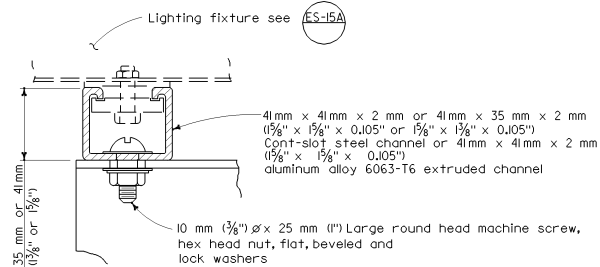
NO SCALE

S9



SAFETY ANGLE DETAILS

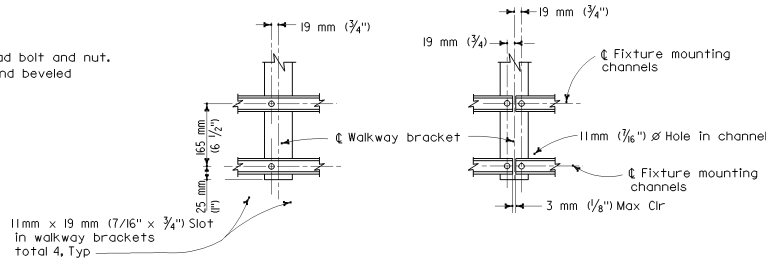
For bridge mounted signs



LIGHT FIXTURE MOUNTING CHANNEL DETAILS

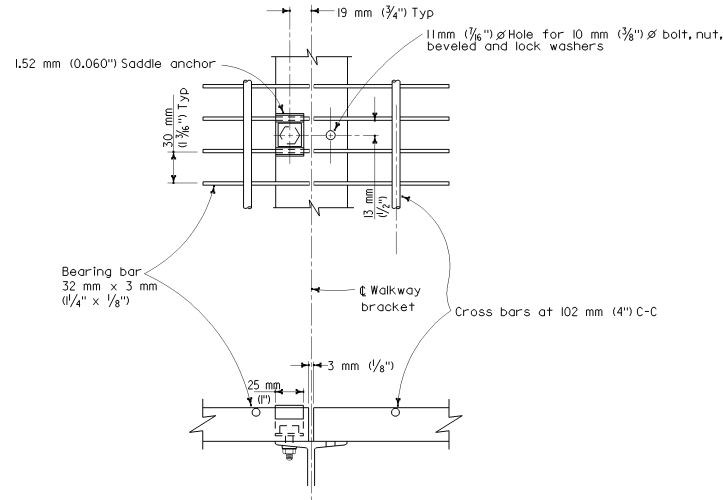
NOTES

- Welded type grating shall have 32 mm x 3 mm (1/4 x 1/8) bearing bars at 30 mm (1 1/8) centers with 6 mm (1/4) diameter (or equal) cross bars at 102 mm (4) centers. If mechanical lock grating is used, it shall be equal in strength to the welded type. Alternate hold-down clips may be submitted for approval.
- Walkway grating and light fixture mounting channels to be continuous (no splices) over as many walkway brackets as practicable consistent with fabrication, ease of handling and assembly.



TYPICAL CONNECTION

CONNECTION AT SPLICE



WALKWAY DETAILS

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

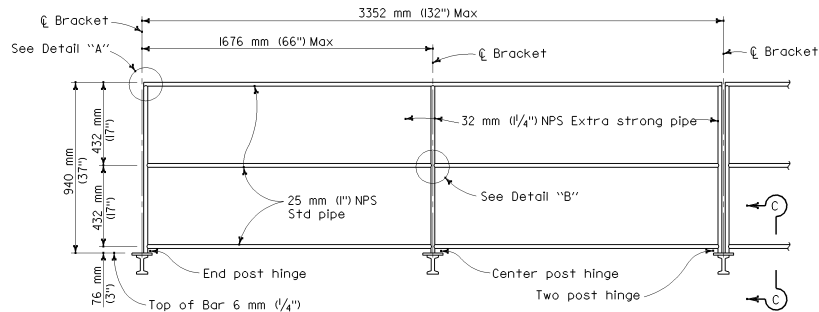
Registered Civil Engineer
 Jeffrey S. Woody
 No. C41260
 State of California
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STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION OVERHEAD SIGNS WALKWAY DETAILS NO. 2

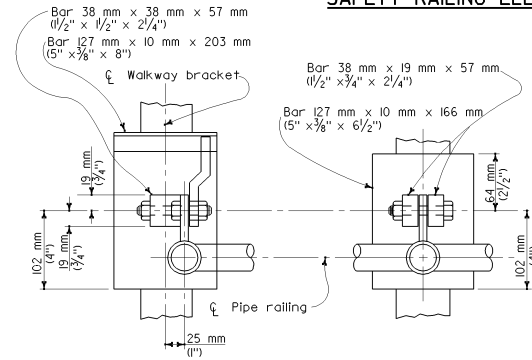
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NO SCALE

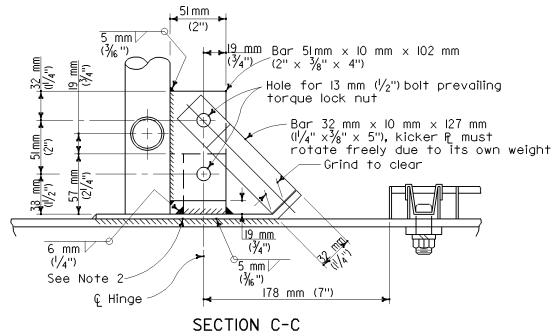
S10



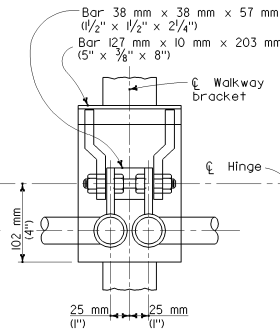
SAFETY RAILING ELEVATION



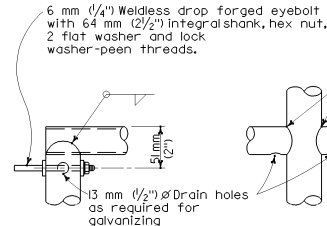
END POST

CENTER POST
WELDED HINGE - PLAN

SECTION C-C



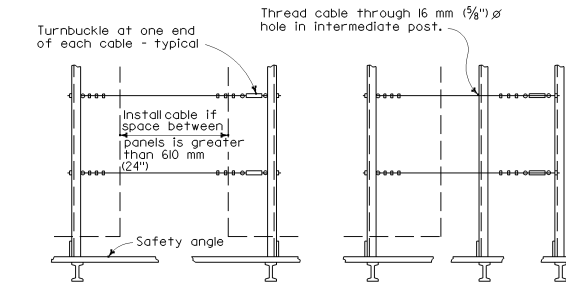
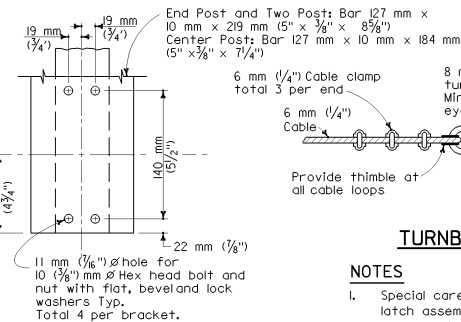
TWO POST

TYPICAL BOLTED (ALTERNATIVE)
HINGED CONNECTION

DETAIL A

NOTES

Alternative venting methods may be used if approved by the Engineer.

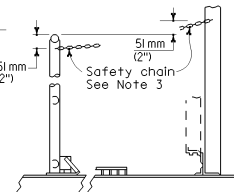
BETWEEN PANELS
SAFETY CABLE ELEVATION
For bridge mounted signs

TURNBUCKLE DETAILS

NOTES

- Special care shall be taken to insure that the complete hinge and latch assembly will hold the safety railing in a steady manner, free of wobble while in the raised position. Maximum allowable displacement from vertical at top of railing when latched shall be 25 mm (1").
- Safety chain shall be 5 mm (3/16") galvanized steel coil chain, approximately 39.4 links per meter (12 links per foot). Length shall be minimum which allows lock-up of safety railing. Minimum of two safety chains per safety railing.

DETAIL B



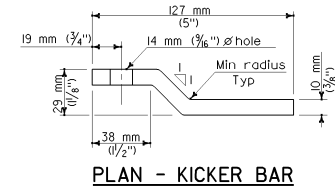
CHAIN ASSEMBLY

DIST	COUNTY	ROUTE	KILOMETER TOTAL PROJECT	POST NO.	SHEET NO.	TOTAL SHEETS

Jeffrey B. Woody
 REGISTERED CIVIL ENGINEER
 No. C41260
 Exp. 3-31-03
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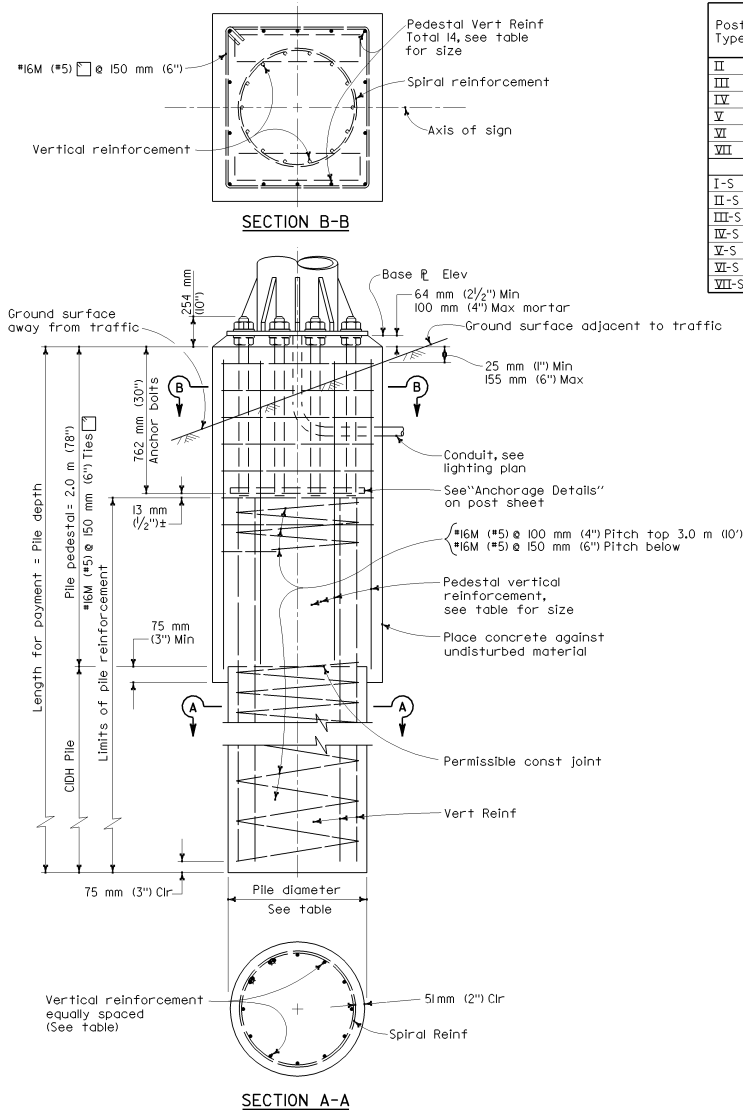
PLAN - KICKER BAR

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**OVERHEAD SIGNS
WALKWAY SAFETY
RAILING DETAILS**

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NO SCALE

S11



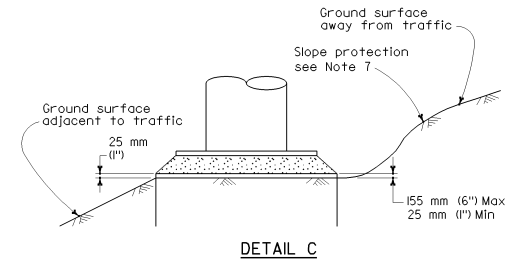
Post Type	Anchor Bolts	Pedestal Size	Reinforcing Steel Vertical	Pile Diameter	Pile Depth **
II	6-51 mm (2'') \varnothing	890 mm x 865 mm (35" x 34")	I4-#22M (#7)	760 mm (30'')	4.5 m (15')
III	6-51 mm (2'') \varnothing	965 mm x 865 mm (38" x 34")	I4-#25M (#8)	760 mm (30'')	4.5 m (15')
IV	6-51 mm (2'') \varnothing	1020 mm x 1020 mm (44" x 40")	I6-#25M (#8)	920 mm (36'')	4.5 m (15')
V	10-51 mm (2'') \varnothing	1170 mm x 1095 mm (46" x 43")	I6-#29M (#9)	920 mm (36'')	5.5 m (18')
VI	10-51 mm (2'') \varnothing	1170 mm x 1095 mm (46" x 43")	I6-#32M (#10)	920 mm (36'')	5.5 m (18')
VII	12-51 mm (2'') \varnothing	1295 mm x 1195 mm (51" x 47")	I6-#36M (#11)	920 mm (36'')	6.5 m (21')
I-S	8-57 mm (2 1/4'') \varnothing	1070 mm x 1020 mm (42" x 40")	I4-#32M (#10)	920 mm (36'')	5.5 m (18')
II-S	8-57 mm (2 1/4'') \varnothing	1070 mm x 1020 mm (42" x 40")	I6-#32M (#10)	920 mm (36'')	6.0 m (20')
III-S	8-57 mm (2 1/4'') \varnothing	1145 mm x 1020 mm (45" x 40")	I6-#36M (#11)	920 mm (36'')	7.0 m (23')
IV-S	8-57 mm (2 1/4'') \varnothing	1245 mm x 1020 mm (49" x 40")	I6-#36M (#11)	920 mm (36'')	7.0 m (23')
V-S	8-57 mm (2 1/4'') \varnothing	1350 mm x 1200 mm (53" x 47")	*24-#36M (#11)	920 mm (36'')	8.0 m (26')
VI-S	8-64 mm (2 1/2'') \varnothing	1470 mm x 1470 mm (58" x 58")	28-#43M (#14)	1370 mm (54'')	8.5 m (28')
VII-S	8-64 mm (2 1/2'') \varnothing	1470 mm x 1470 mm (58" x 58")	28-#43M (#14)	1370 mm (54'')	8.5 m (28')

** Use Foundation Depth shown in table unless otherwise shown on the Project Plans.

* Bundled bars

NOTES:

- For anchor bolt layout see post sheet.
- For "Base Elevation" see Project Plans.
- Pedestal and pile shall be Class "2" PCC.
- Pedestals and base plates, longer sides shall be normal to axis of sign.
- Prior to erection of the post, backfill which is equivalent to the surrounding material shall be in place.
- Pedestal shall be formed 150 mm (6'') minimum below ground surface. Remainder to be placed against undisturbed material.
- Slope protection required when indicated on the Project Plans.
- Foundation design is based on a lateral soil pressure of 86 kPa (1,800 pounds per square foot).



STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION OVERHEAD SIGNS-TRUSS PILE FOUNDATION

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NO SCALE

S13

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
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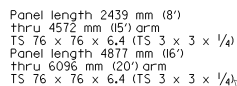
REGISTERED PROFESSIONAL ENGINEER

Jeffrey B. Woody

No. C41260

Exp. 3-31-03

STATE OF CALIFORNIA



MOUNTING BEAM		SPACING		
Sign Panel Length	Number Mounting Beams	Sign Panel Overhang	Mounting Beam Spacing	
			C	E
1524 mm (5')	2	209 mm (9")	1066 mm (42")	
1829 mm (6')	2	335 mm (11")	1219 mm (48")	
2134 mm (7')	2	381 mm (15")	1372 mm (54")	
2438 mm (8')	2	457 mm (18")	1524 mm (60")	
2743 mm (9')	2	559 mm (22")	1625 mm (64")	
3048 mm (10')	2	610 mm (24")	1829 mm (72")	
3353 mm (11')	2	610 mm (24")	2134 mm (84")	
3657 mm (12')	2	762 mm (30")	2134 mm (84")	
3962 mm (13')	2	762 mm (30")	2438 mm (96")	
4267 mm (14')	2	762 mm (30")	2743 mm (108")	
4572 mm (15')	2	914.5 mm (36")	2743 mm (108")	
4877 mm (16')	3	152.5 mm (6")	2286 mm (90")	2286 mm (90")
5182 mm (17')	3	305 mm (12")	2286 mm (90")	2286 mm (90")
5486 mm (18')	3	305 mm (12")	2438 mm (96")	2438 mm (96")
5792 mm (19')	3	305 mm (12")	2591 mm (102")	2591 mm (102")
6096 mm (20')	3	457 mm (18")	2591 mm (102")	2591 mm (102")

1. For sections and detail not shown see
2. For post and foundation details see
Standard Plans S20A and S20B.
3. Drilled holes, plugs, conduit and handhole
required on illuminated signs only.

OVERHEAD SINGLE-WEIGHT BALANCED-SINGLE STEEL POST CONNECTION AND MOUNTING DETAILS

These "Standard Plans for Construction of Local Streets and Roads" contain units in two systems of measurement: International System of Units (SI or "metric") and United States Standard Measures shown in the parentheses (). The measurements expressed in the two systems are not necessarily equal or interchangeable. See the "Foreword" at the beginning of this publication.

S14A



SECTION C-C

SECTION D-D

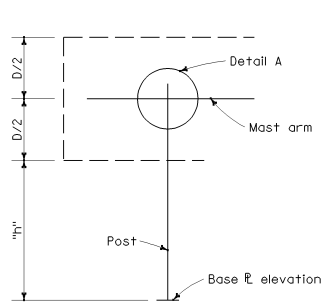
DETAIL H

SECTION E-E

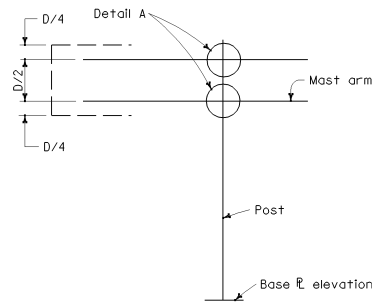
NO SCALE

\$14B

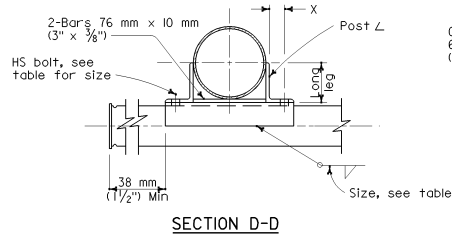




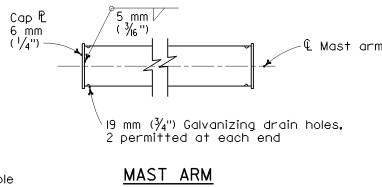
**SINGLE ARM SERIES
TYPE B-1**



**DOUBLE ARM SERIES
TYPE B-2**



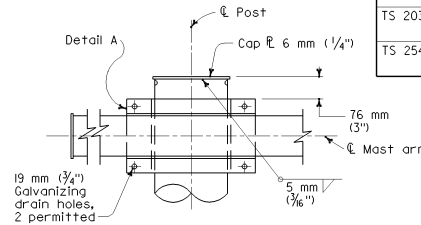
SECTION D-D



MAST ARM

END DETAIL

POST ANGLES			
Post Size	Angle	X	Weld
6	L 102 mm x 76 mm x 12.7 mm (4" x 3" x 1/2")	45 mm (1 3/4")	7 mm (1/4")
8	L 127 mm x 76 mm x 12.7 mm (5" x 3" x 1/2")		
10	L 152 mm x 102 mm x 15.9 mm (6" x 4" x 5/8")		
12	L 178 mm x 102 mm x 15.9 mm (7" x 4" x 5/8")	64 mm (2 1/2")	8 mm (5/16")
14	L 203 mm x 102 mm x 19.0 mm (8" x 4" x 3/4")		



POST CAP

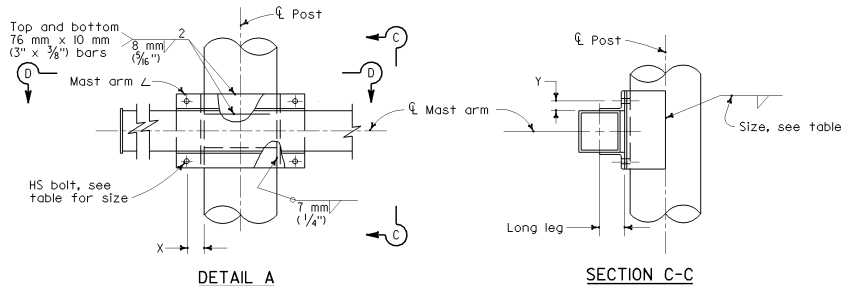
NOTES

For post connection to base plate, see **S20A**

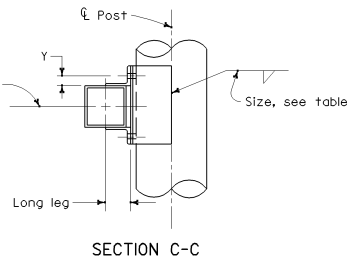
For mast arm length and mast arm-to-sign panel connections, see **S18A**

See Format sheet for:

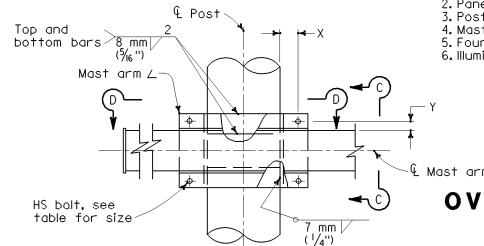
1. Sign type and location.
2. Panel type and location on structure.
3. Post size and dimension "h".
4. Mast arm size.
5. Foundation type.
6. Illumination if required.



DETAIL A



SECTION C-C



DETAIL B


STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION OVERHEAD SIGNS-LIGHTWEIGHT TYPE B CONNECTION DETAILS

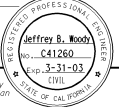
These "Standard Plans for Construction of Local Streets and Roads" contain units in two systems of measurement: International System of Units (SI or "metric") and United States Standard Measures shown in the parentheses ("). The measurements expressed in the two systems are not necessarily equal or interchangeable. See the "Foreword" at the beginning of this publication.

NO SCALE

S16

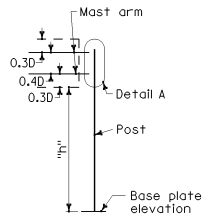
DIST	COUNTY	ROUTE	KILOMETER TOTAL PROJECT	POST NO.	SHEET TOTAL SHEETS


 REGISTERED CIVIL ENGINEER
 July 1, 2002
 PLANS APPROVAL DATE
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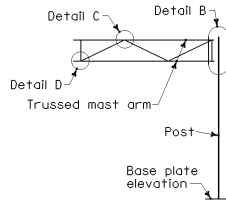


POST TO ARM FRAMING DATA

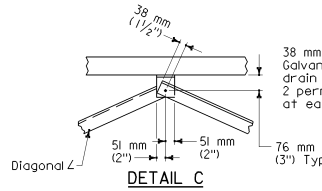
MAST ARM ANGLES				
Arm Size	Angle	HS Bolt	Y	Weld
TS 76 mm x 76 mm x 6.4 mm (3" x 3" x 1/4")	L 51 mm x 51 mm x 9.5 mm (2" x 2" x 3/8")	M16 (1/2")	29 mm (1 1/8")	7 mm (1/4")
TS 102 mm x 102 mm x 6.4 mm (4" x 4" x 1/4")	L 64 mm x 51 mm x 9.5 mm (2 1/2" x 2" x 3/8")			
TS 127 mm x 127 mm x 6.4 mm (5" x 5" x 1/4")	L 76 mm x 64 mm x 9.5 mm (3" x 2 1/2" x 3/8")	M16 (5/8")	35 mm (1 3/8")	
TS 152 mm x 152 mm x 6.4 mm (6" x 6" x 1/4")	L 89 mm x 64 mm x 9.5 mm (3 1/2" x 2 1/2" x 3/8")			
TS 178 mm x 178 mm x 6.4 mm (7" x 7" x 1/4")	L 102 mm x 76 mm x 12.7 mm (4" x 3" x 1/2")	M20 (3/4")	45 mm (1 3/4")	8 mm (5/16")
TS 203 mm x 203 mm x 6.4 mm (8" x 8" x 1/4")	L 127 mm x 76 mm x 12.7 mm (5" x 3" x 1/2")			
TS 254 mm x 254 mm x 6.4 mm (10" x 10" x 1/4")	L 156 mm x 102 mm x 15.9 mm (6" x 4" x 5/8")	M22 (7/8")	64 mm (2 1/2")	



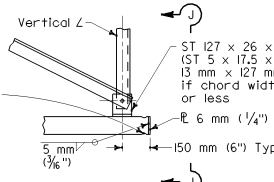
DOUBLE MASS ARM SERIES
TYPE C-1



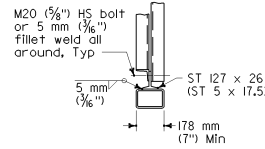
TRUSSED MASS ARM SERIES
TYPE C-2



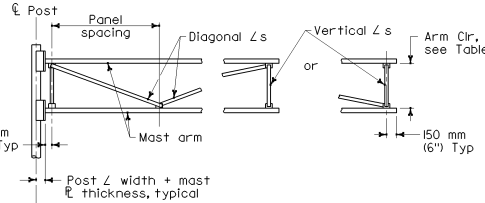
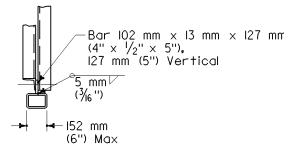
DETAIL C



DETAIL D



SECTION J-J



TRUSS FRAMING DATA

Sign Depth	Arm Clearance	Max Panel Spacing	Vertical Angle	Diagonal Angle
D=1016 mm-1778 mm (40"-70")	610 mm (24")	1321 mm (52")	51 mm x 51 mm x 6.4 mm (2" x 2" x 1/4")	51 mm x 51 mm x 6.4 mm (2" x 2" x 1/4")
D=2032 mm-2540 mm (80"-100")	914 mm (36")	1981 mm (78")	89 mm x 64 mm x 6.4 mm (3 1/2" x 2 1/2" x 1/4")	89 mm x 64 mm x 6.4 mm (3 1/2" x 2 1/2" x 1/4")

*Short leg outstanding

NOTES

For General Notes, see S20A

For post connection to base plate, see S20A

For mast arm length and mast arm-to-sign panel connections, see S18A

See Format sheet for:

1. Sign type and location.
2. Panel type and location on structure.
3. Post size and dimension "H".
4. Mast arm size.
5. Foundation type.
6. Illumination if required.

NOTE

"T" equals vertical dimension of mast arm.

Bottom connection shown. Top similar.

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
<p>Jeffrey S. Woody REGISTERED CIVIL ENGINEER No. C41260 Exp. 3-31-03 STATE OF CALIFORNIA</p> <p>July 1, 2002 PLANS APPROVAL DATE</p> <p>The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.</p> <p>Caltrans now has a web site! To get to the web site, go to http://www.dot.ca.gov</p>					

POST TO ARM FRAMING DATA

MAST ARM ANGLES			
Arm Size	Angle	Plate	HS Bolt
TS 76 mm x 76 mm x 6.4 mm (3" x 3" x 1/4")		19 mm (3/4")	M16 (1/2")
TS 102 mm x 102 mm x 6.4 mm (4" x 4" x 1/4")		25.4 mm (1")	M16 (5/8")
TS 127 mm x 127 mm x 6.4 mm (5" x 5" x 1/4")			M20 (3/4")
TS 152 mm x 152 mm x 6.4 mm (6" x 6" x 1/4")			
TS 178 mm x 178 mm x 6.4 mm (7" x 7" x 1/4")	L 127 mm x 76 mm x 9.5 mm (5" x 3" x 3/8")	32 mm (1 1/8")	M22 (7/8")
	L 152 mm x 102 mm x 9.5 mm (6" x 4" x 3/8")		
	L 178 mm x 127 mm x 9.5 mm (7" x 5" x 3/8")		
	L 203 mm x 152 mm x 9.5 mm (8" x 6" x 3/8")		
	L 254 mm x 152 mm x 9.5 mm (10" x 6" x 3/8")		M27 (1")

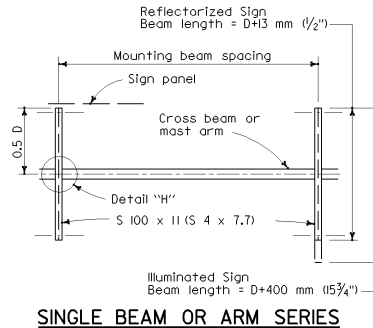
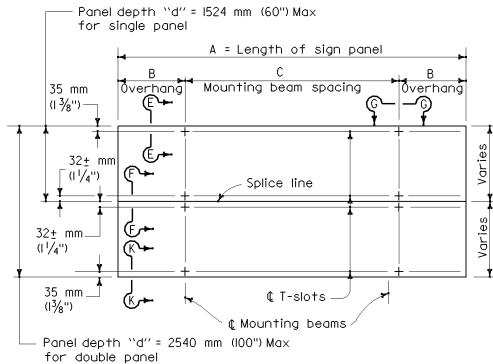
POST ANGLES			
Post Size	Angle	X	Weld
6	L 127 mm x 76 mm x 12.7 mm (5" x 3" x 1/2")	44 mm (1 3/4")	
8	L 152 mm x 102 mm x 15.9 mm (6" x 4" x 5/8")		7 mm (1/4")
10	L 178 mm x 102 mm x 15.9 mm (7" x 4" x 5/8")	57 mm (2 1/4")	
12	L 203 mm x 102 mm x 19.0 mm (8" x 4" x 3/4")		8 mm (5/16")
14	L 203 mm x 102 mm x 19.0 mm (8" x 4" x 3/4")		

**STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
OVERHEAD SIGNS-LIGHTWEIGHT
TYPE C
CONNECTION DETAILS**

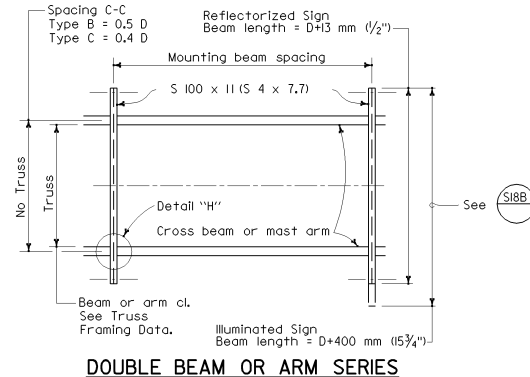
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NO SCALE

S17

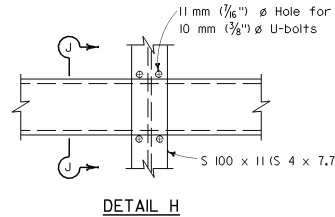
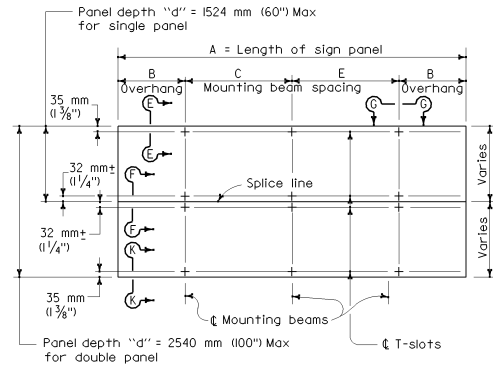


SINGLE BEAM OR ARM SERIES

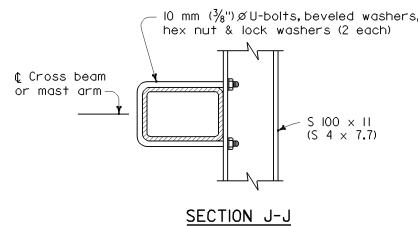


DOUBLE BEAM OR ARM SERIES

SIGN PANEL LENGTH 1524 mm (5') TO 4572 mm (15')



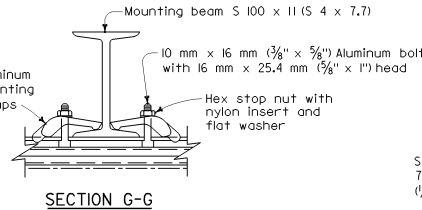
DETAIL H



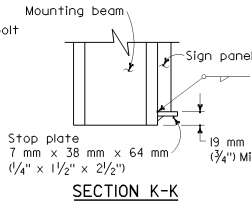
SECTION J-J

SIGN PANEL LENGTH 4877 mm (16') TO 7315 mm (24')

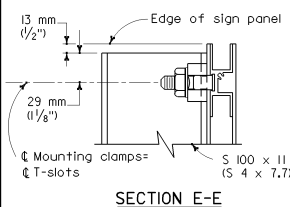
ELEVATION



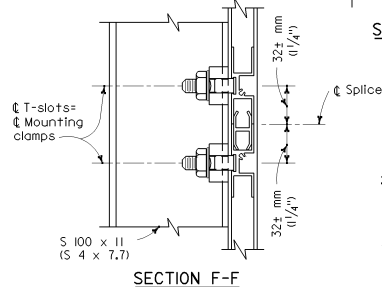
SECTION G-G



SECTION K-K



SECTION E-E



SECTION F-F

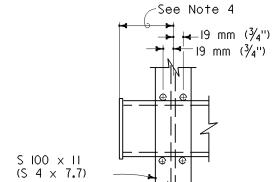
NOTES:

1. Laminated panel sign depths more than 1500 mm (60") requires additional mounting clamps located 32 mm (1 1/4") each side of panel splice line. Exact location is dependent on sign panel manufacturer.
2. Position sign panel so that mounting beams will clear truss connections and arm to post joints. Where interference cannot be avoided, 13 mm (1/2") ϕ holes to pass the 10 mm (3/8") ϕ U-bolts may be drilled through mast arm angles or truss connection members as necessary.
3. Torque aluminum sign panel mounting bolt to 11.6 m/N (100 inch pounds).
4. 300 mm (12") for Type C-1 and C-2, others 102 mm (4").
5. A stop plate is required at each mounting beam under sign panel.

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

Registered Professional Engineer
 Jeffrey B. Woody
 No. C41260
 Exp. 3-31-03
 STATE OF CALIFORNIA

July 1, 2002
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END ARM DETAIL
SINGLE POST SIGNS

MOUNTING BEAM SPACING

Sign Panel Length *	Number Mounting Beams	Sign Panel Overhang B	Mounting Beam Spacing C	E
1524 mm (5')	2	229 mm (9")	1066 mm (42")	
1829 mm (6')	2	305 mm (10")	1219 mm (48")	
2134 mm (7')	2	381 mm (15")	1372 mm (54")	
2438 mm (8')	2	457 mm (18")	1524 mm (60")	
2743 mm (9')	2	559 mm (22")	1625 mm (64")	
3048 mm (10')	2	610 mm (24")	1829 mm (72")	
3353 mm (11')	2	610 mm (24")	2134 mm (84")	
3657 mm (12')	2	762 mm (30")	2134 mm (84")	
3962 mm (13')	2	762 mm (30")	2438 mm (96")	
4267 mm (14')	2	762 mm (30")	2743 mm (108")	
4572 mm (15')	2	915 mm (36")	2743 mm (108")	
4877 mm (16')	3	152 mm (6")	2286 mm (90")	2286 mm (90")
5182 mm (17')	3	305 mm (12")	2286 mm (90")	2286 mm (90")
5486 mm (18')	3	305 mm (12")	2438 mm (96")	2438 mm (96")
5792 mm (19')	3	305 mm (12")	2591 mm (102")	2591 mm (102")
6096 mm (20')	3	457 mm (18")	2591 mm (102")	2591 mm (102")
6400 mm (21')	3	457 mm (18")	2743 mm (108")	2743 mm (108")
6706 mm (22')	3	610 mm (24")	2743 mm (108")	2743 mm (108")
7010 mm (23')	3	762 mm (30")	2743 mm (108")	2743 mm (108")
7315 mm (24')	3	914.5 mm (36")	2743 mm (108")	2743 mm (108")

* Signs longer than 7315 mm (24') are fabricated and mounted as adjoining single panels.

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION OVERHEAD SIGNS-LIGHTWEIGHT SIGN PANEL MOUNTING DETAILS LAMINATED PANEL-TYPE A

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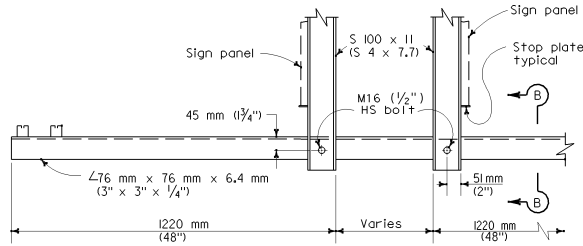
NO SCALE

S18A

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

Registered Civil Engineer
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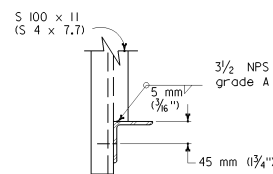
Jeffrey S. Woody
 No. C41260
 Exp. 3-31-03
 (TTL)
 STATE OF CALIFORNIA



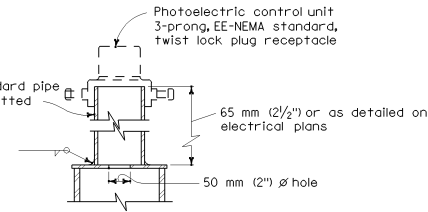
SIDE VIEW - DOUBLE FACED SIGN - END MOUNT

NOTE:

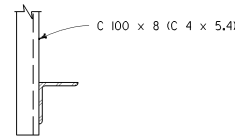
For details not shown see "Side View - Single Faced Sign Type A, B & C" details.



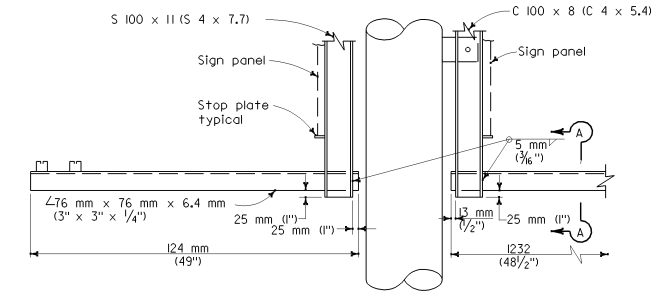
PART SECTION B-B



PHOTOELECTRIC CONTROL UNIT

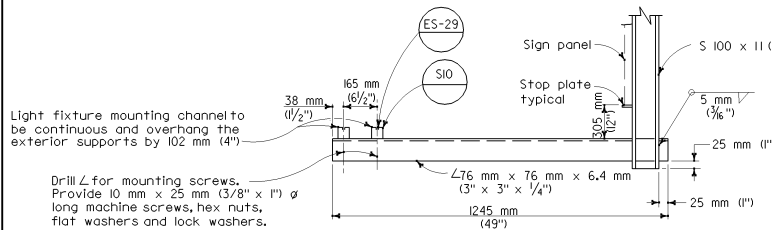


PART SECTION A-A



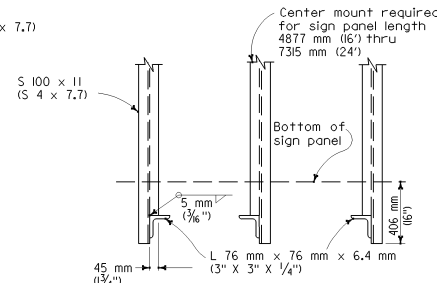
SIDE VIEW - DOUBLE FACED SIGN - CENTER MOUNT

(Required only on balanced single post sign panel length 4877 mm (16 feet) thru 7315 mm (24 feet))



**SIDE VIEW - SINGLE FACED SIGN TYPES A, B & C
LIGHT FIXTURE MOUNTING DETAIL
SIGNS GREATER THAN 1676 mm (66 inches) IN LENGTH**

For signs 1676 mm (66 inches) or less in length see sheet for "Fluorescent Sign Lighting Equipment 915 mm (36 inches)"



FRONT VIEW

STATE OF CALIFORNIA
 DEPARTMENT OF TRANSPORTATION
**OVERHEAD SIGNS-LIGHTWEIGHT
 LIGHT FIXTURE
 MOUNTING DETAILS**

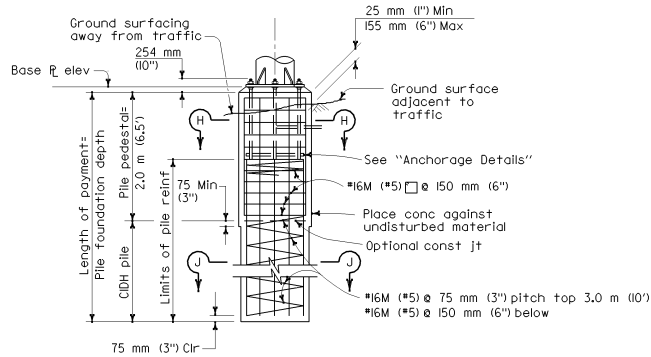
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NO SCALE

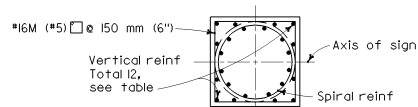
S18B

[Return to Table of Contents](#)

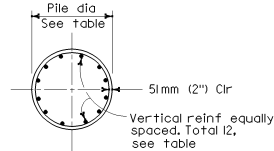
POST SIZE		PILE FOUNDATION					SPREAD FOOTING				
NPS	"x"	Pedestal	Pile Dia	Pile Depth	Vertical Reinf	Pedestal	Footing	Reinforcement			
								Top	Bottom	L Bar	
6	7.11 mm (5/32")	864 mm x 864 mm (34" x 34")	762 mm (30")	3.0 m (10')	#19M (#6)	762 mm x 762 mm (30" x 30")	1.3 m x 1.9 m (4' x 6')	#16M (#5)	#16M (#5)	#16M (#5)	
6	10.97 mm (7/16")	864 mm x 864 mm (34" x 34")	762 mm (30")	3.0 m (10')	#19M (#6)	762 mm x 762 mm (30" x 30")	1.3 m x 2.2 m (4' x 7')	#16M (#5)	#16M (#5)	#16M (#5)	
8	8.18 mm (5/16")	864 mm x 864 mm (34" x 34")	762 mm (30")	3.0 m (10')	#19M (#6)	762 mm x 762 mm (30" x 30")	1.6 m x 2.5 m (5' x 8')	#16M (#5)	#16M (#5)	#16M (#5)	
8	12.7 mm (1/2")	864 mm x 864 mm (34" x 34")	762 mm (30")	3.4 m (11')	#22M (#7)	762 mm x 762 mm (30" x 30")	1.9 m x 2.8 m (6' x 9')	#16M (#5)	#16M (#5)	#16M (#5)	
10	12.7 mm (1/2")	1016 mm x 1016 mm (40" x 40")	914 mm (36")	4.0 m (13')	#25M (#8)	914 mm x 914 mm (36" x 36")	2.2 m x 3.1 m (7' x 10')	#16M (#5)	#25M (#8)	#25M (#8)	
12	12.7 mm (1/2")	1016 mm x 1016 mm (40" x 40")	914 mm (36")	4.6 m (15')	#32M (#10)	914 mm x 914 mm (36" x 36")	2.2 m x 3.7 m (7' x 12')	#19M (#6)	#25M (#8)	#25M (#8)	
14	12.7 mm (1/2")	1016 mm x 1016 mm (40" x 40")	914 mm (36")	4.6 m (15')	#32M (#10)	914 mm x 914 mm (36" x 36")	2.2 m x 4.0 m (7' x 13')	#25M (#8)	#29M (#9)	#25M (#8)	
14	15.88 mm (5/8")	1016 mm x 1016 mm (40" x 40")	914 mm (36")	4.9 m (16')	#32M (#10)	914 mm x 914 mm (36" x 36")	2.5 m x 4.3 m (8' x 14')	#25M (#8)	#29M (#9)	#25M (#8)	



ELEVATION



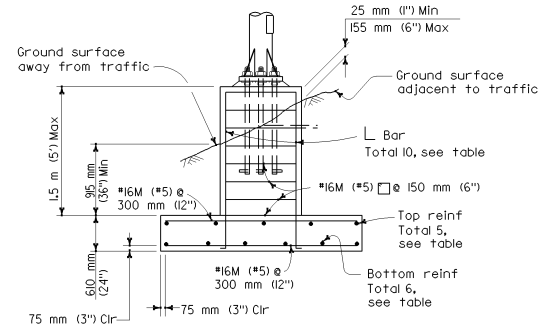
SECTION H-H



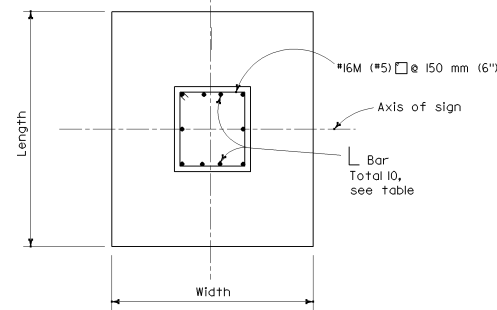
SECTION J-J

6 NPS THRU 14 NPS POSTS

PILE FOUNDATION



ELEVATION

PLAN
SPREAD FOOTING

NOTES:

1. Backfill shall be in place prior to erection of post.
2. Slope protection required when indicated on the plans.
3. Pile pedestal shall be formed 155 mm (6") minimum below ground surface. Remainder to be placed against undisturbed material.

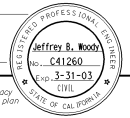
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**OVERHEAD SIGNS-LIGHTWEIGHT
FOUNDATION DETAILS**

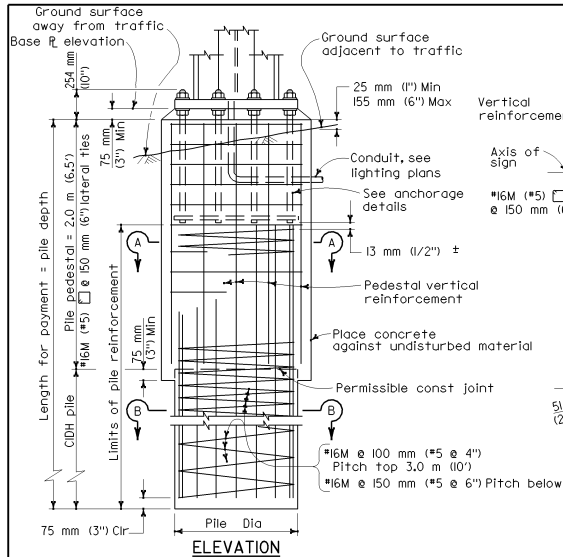
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NO SCALE

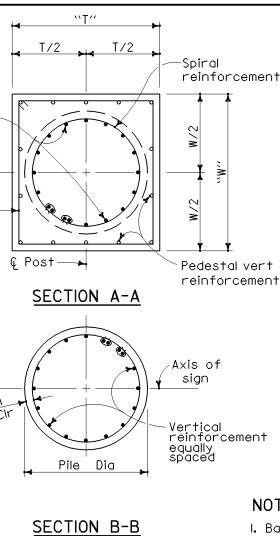
S20B

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
<p>Jeffrey B. Woody REGISTERED CIVIL ENGINEER</p> <p>July 1, 2002 PLANS APPROVAL DATE</p> <p>The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.</p> <p>Caltrans now has a web site. To get to the web site, go to: http://www.dtd.ca.gov</p>					





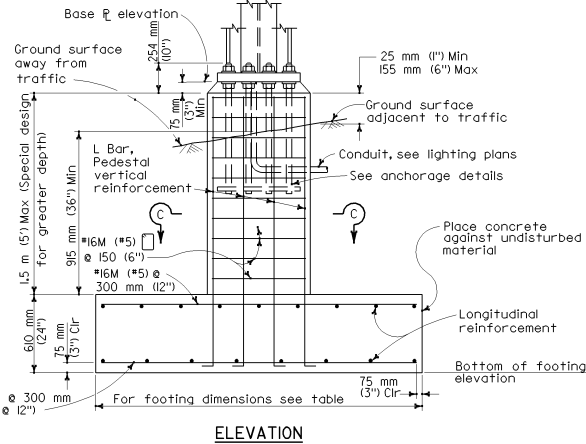
PILE FOUNDATION



SECTION B-B

NOTES:

1. Base plates, pedestals and footings; longer sides shall be normal to axis of sign.
2. For anchor bolt layout see Standard Plans S40F and S40J.
3. For base plate elevation see Format sheet.
4. Prior to erection of the post, backfill which is equivalent to the surrounding material shall be in place.



ELEVATION

SPREAD FOOTING

5. Pile pedestal shall be formed 155 mm (6") minimum below ground surface. Remainder to be placed against undisturbed material.
6. Pile footing - use foundation depth shown in table unless otherwise shown on Format sheet.
7. On single post sign structures the post shall be raked out of plumb with the use of the levelling nuts to make the bottom of the sign frame level.

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
July 1, 2002 PLANS APPROVAL DATE The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet. Contractors now have a web site! To get to the web site, go to: http://www.dot.ca.gov					

SECTION C-C

TWO POST TYPE

		Pile Foundation				Spread Footing				
Post Type	Pedestal Size "T" x "W"	Vertical Reinf	Pile Dia	Pile Depth	Pedestal Vert Reinf	Footing Dimension	Top Reinf		Bottom Reinf	
							Longit	Transv	Longit	Transv
A-1	1.05 m x 1.25 m (41" x 49")	16-#25M (#8)	920 mm (36")	4.3 m (14')	14-#22M (#7)	2.2 m x 4.9 m (7' x 16')	7-#16M (#5)		6-#29M (#9)	
A-2		16-#29M (#9)		4.9 m (16')	14-#25M (#8)	2.5 m x 5.2 m (8' x 17')	10-#16M (#5)		10-#29M (#9)	
A-3		16-#36M (#11)		6.1 m (20')	14-#29M (#9)	2.5 m x 5.5 m (8' x 18')	8-#19M (#6)		9-#36M (#11)	
A-4		*24-#36M (#11)		6.4 m (21')	14-#29M (#9)	2.5 m x 6.1 m (8' x 20')	8-#25M (#8)		11-#36M (#11)	
A-5		*24-#36M (#11)		6.4 m (21')	14-#32M (#10)	2.5 m x 6.1 m (8' x 20')	8-#25M (#8)		11-#36M (#11)	
B-1	1.05 m x 1.35 m (41" x 53")	*16-#36M (#11)	1070 mm (42")	6.1 m (20')	14-#25M (#8)	2.5 m x 5.5 m (8' x 18')	8-#19M (#6)		9-#36M (#11)	
B-2	1.05 m x 1.35 m (41" x 53")	*24-#36M (#11)		6.7 m (22')	14-#29M (#9)	2.5 m x 6.1 m (8' x 20')	10-#19M (#6)		11-#36M (#11)	
B-3	1.05 m x 1.40 m (41" x 55")	*28-#36M (#11)		7.4 m (24')	14-#32M (#10)	2.5 m x 6.4 m (8' x 21')	7-#25M (#8)		13-#36M (#11)	
B-4	1.20 m x 1.40 m (47" x 55")	*24-#36M (#11)		6.7 m (22')	14-#32M (#10)	2.5 m x 6.7 m (8' x 22')	7-#25M (#8)		14-#36M (#11)	
B-5	1.20 m x 1.40 m (47" x 55")	*24-#36M (#11)		7.0 m (23')	14-#32M (#10)	2.5 m x 7.1 m (8' x 23')	8-#25M (#8)		15-#36M (#11)	
C-1	1.05 m x 1.05 m (41" x 41")	16-#29M (#9)	920 mm (36")	4.9 m (16')	14-#22M (#7)	2.2 m x 4.9 m (7' x 16')	6-#19M (#6)	*16M Ø 300 mm (#5 & 12")	7-#36M (#11)	*16M Ø 300 mm (#5 & 12")
C-2	1.05 m x 1.15 m (41" x 45")	16-#36M (#11)		5.8 m (19')	14-#29M (#9)	2.5 m x 5.2 m (8' x 17')	8-#19M (#6)		9-#36M (#11)	
C-3	1.05 m x 1.15 m (41" x 45")	*24-#36M (#11)		6.4 m (21')	14-#32M (#10)	2.5 m x 5.8 m (8' x 19')	9-#19M (#6)		11-#36M (#11)	
C-4	1.05 m x 1.15 m (41" x 45")	*28-#36M (#11)		7.4 m (24')	14-#32M (#10)	2.5 m x 6.4 m (8' x 21')	7-#25M (#8)		13-#36M (#11)	
C-5	1.20 m x 1.20 m (47" x 47")	*24-#36M (#11)		6.7 m (22')	14-#36M (#11)	2.5 m x 6.7 m (8' x 22')	8-#25M (#8)		15-#36M (#11)	
C-6		*24-#36M (#11)	1070 mm (42")	7.1 m (23')	14-#36M (#11)	2.5 m x 7.1 m (8' x 23')	8-#25M (#8)		16-#36M (#11)	
C-7		*28-#36M (#11)		7.4 m (24')	14-#36M (#11)	2.5 m x 7.1 m (8' x 23')	8-#25M (#8)		12-#43M (#14)	
C-8		*34-#36M (#11)		7.7 m (25')	*28-#32M (#10)	2.5 m x 7.4 m (8' x 24')	9-#25M (#8)		13-#43M (#14)	
D-1	1.05 m x 1.25 m (41" x 49")	*24-#36M (#11)		6.4 m (21')	14-#29M (#9)	2.5 m x 5.8 m (8' x 19')	9-#19M (#6)		10-#36M (#11)	
D-2	1.05 m x 1.30 m (41" x 51")	*28-#36M (#11)		7.4 m (24')	14-#32M (#10)	2.5 m x 6.4 m (8' x 21')	7-#25M (#8)		13-#36M (#11)	
D-3	1.20 m x 1.30 m (47" x 51")	*24-#36M (#11)	1070 mm (42")	7.4 m (24')	14-#36M (#11)	2.5 m x 7.1 m (8' x 23')	8-#25M (#8)		16-#36M (#11)	
D-4		*34-#36M (#11)		8.3 m (27')	14-#36M (#11)	2.5 m x 7.1 m (8' x 23')	8-#25M (#8)		18-#36M (#11)	
D-5		*34-#36M (#11)		9.2 m (30')	*28-#32M (#10)	2.5 m x 7.7 m (8' x 25')	9-#25M (#8)		14-#43M (#14)	
D-6	1.30 m x 1.40 m (51" x 55")	*34-#36M (#11)		9.2 m (30')	14-#36M (#11)	2.5 m x 8.0 m (8' x 26')	10-#25M (#8)		14-#43M (#14)	
D-7		*34-#36M (#11)		9.2 m (30')	14-#36M (#11)	2.5 m x 8.0 m (8' x 26')	10-#25M (#8)		15-#43M (#14)	

* Bundled bars

SINGLE POST TYPE

SINCE 1957 TYPE										
Post Type	Pedestal Size "T" x "W"	Pile Foundation				Spread Footing				
		Vertical Reinf	Pile Dia	Foundation Depth	Pedestal Vert Reinf	Footing Dimension	Top Reinf		Bottom Reinf	
							Longit	Transv	Longit	Transv
E-1	1.02 m x 1.12 m (40" x 44")	16-#25M (#8)	920 mm (36")	4.0 m (13')	14-#25M (#8)	2.5 m x 4.3 m (8' x 14')	6-#16M (#5)		9-#22M (#7)	*16M Ø 300 mm
E-2	1.02 m x 1.12 m (40" x 44")	16-#29M (#9)		4.6 m (15')	14-#29M (#9)	2.8 m x 4.6 m (8' x 15')	6-#19M (#6)	*16M Ø 300 mm (*5 e 12")	9-#29M (#9)	*16M Ø 300 mm (*5 e 12")
E-3	1.12 m x 1.12 m (44" x 44")	16-#36M (#11)		5.5 m (18')	14-#36M (#11)	2.5 m x 5.5 m (8' x 18')	6-#19M (#6)		9-#36M (#11)	
E-4	1.12 m x 1.12 m (44" x 44")	16-#36M (#11)		6.1 m (20')	14-#36M (#11)	2.5 m x 6.1 m (8' x 20')	6-#19M (#6)		9-#36M (#11)	
F-1		16-#25M (#8)		4.0 m (13')	14-#25M (#8)	2.5 m x 4.0 m (8' x 13')	8-#16M (#5)		10-#22M (#7)	
F-2		16-#29M (#9)	4.6 m (15')	14-#29M (#9)	2.8 m x 4.6 m (8' x 15')	8-#16M (#5)	*16M Ø 300 mm (*5 e 12")	11-#25M (#8)		
F-3	1.02 m x 1.12 m (40" x 44")	16-#29M (#9)	4.9 m (16')	14-#29M (#9)	2.5 m x 4.9 m (8' x 16')	9-#16M (#5)		10-#29M (#9)	*16M Ø 300 mm	
F-4		16-#36M (#11)	5.8 m (19')	14-#36M (#11)	2.5 m x 5.8 m (8' x 19')	6-#19M (#6)		10-#36M (#11)		
F-5		16-#36M (#11)	6.7 m (22')	14-#36M (#11)	2.5 m x 6.7 m (8' x 22')	6-#19M (#6)		12-#36M (#11)		


STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**OVERHEAD SIGNS-BOX BEAM
CLOSED TRUSS
FOUNDATION DETAILS**

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NO SCALE

S39

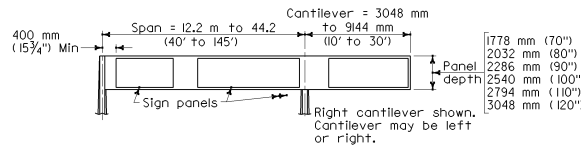
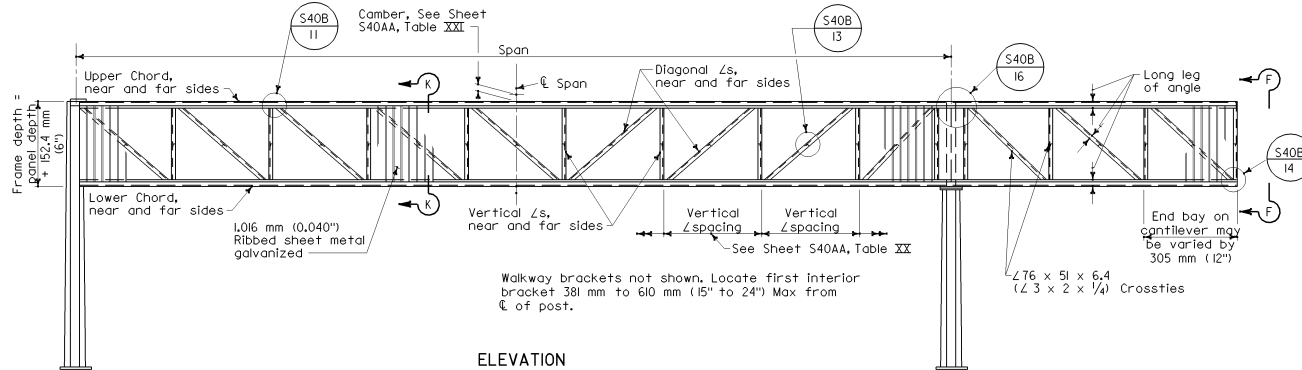
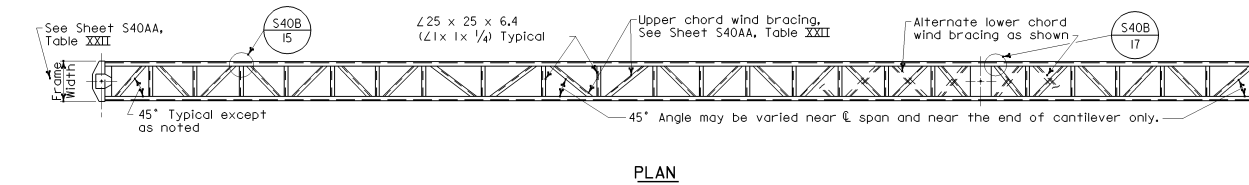
DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS



July 1, 2002
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RANGE OF STRUCTURE SIZES

NOTES

1. Frame widths shown are nominal. These widths may be varied by 6 mm (1/4") to standardize fabrication methods.
2. For View F-F, see S40D
3. For Section K-K, see S40B
4. For Foundation Details, see S39
5. For General Notes, see S1

STATE OF CALIFORNIA
 DEPARTMENT OF TRANSPORTATION
**OVERHEAD SIGNS - BOX BEAM
 CLOSED TRUSS - TWO POST TYPE
 FRAME MEMBERS**

These "Standard Plans for Construction of Local Streets and Roads" contain units in two systems of measurement: International System of Units (SI or "metric") and United States Standard Measures shown in the parentheses (). The measurements expressed in the two systems are not necessarily equal or interchangeable. See the "Foreword" at the beginning of this publication.

NO SCALE

S40A

TABLE XX

Panel Depth	Frame Depth	Max. Vertical L Spacing
1778 mm (70")	1931 mm (76")	1829 mm (72")
2032 mm (80")	2185 mm (86")	
2286 mm (90")	2439 mm (96")	2286 mm (90")
2540 mm (100")	2693 mm (106")	
2794 mm (110")	2947 mm (116")	3048 mm (120")
3048 mm (120")	3201 mm (126")	

TABLE XXI

Fabrication Camber at L Span	
Span	Camber
12.2 m - 21.5 m (40' - 70')	25 mm (1")
21.6 m - 30.7 m (70' - 100')	45 mm (1 3/4")
30.8 m - 36.8 m (100' - 120')	57 mm (2 1/4")
36.9 m - 44.2 m (120' - 145')	70 mm (2 3/4")

Camber of cantilever arm $\pm +13$ mm (1/2") for arms greater than 3.05 m (10').

Camber to approximate parabola.

TABLE XXII

1778 mm (70") Panel Depth						2032 mm (80") Panel Depth						2286 mm (90") Panel Depth					
Span	Frame Width	Chord L's	Vertical L's	Diagonal L's	Wind Bracing L's	Frame Width	Chord L's	Vertical L's	Diagonal L's	Wind Bracing L's	Frame Width	Chord L's	Vertical L's	Diagonal L's	Wind Bracing L's	Frame Width	Chord L's
12.2 mm-15.4 mm (40'-50')	610 mm (24")	127 mm x 76 mm x 111 mm (5" x 3" x 3/8")	76 mm x 76 mm x 7.9 mm (3" x 3" x 5/8")	76 mm x 76 mm x 6.4 mm (3" x 3" x 1/4")	38 mm x 38 mm x 6.4 mm (1 1/2" x 1 1/2" x 1/4")	610 mm (24")	127 mm x 76 mm x 111 mm (5" x 3" x 3/8")	76 mm x 76 mm x 7.9 mm (3" x 3" x 5/8")	76 mm x 76 mm x 6.4 mm (3" x 3" x 1/4")	38 mm x 38 mm x 6.4 mm (1 1/2" x 1 1/2" x 1/4")	610 mm (24")	127 mm x 76 mm x 111 mm (5" x 3" x 3/8")	76 mm x 76 mm x 7.9 mm (3" x 3" x 5/8")	76 mm x 76 mm x 6.4 mm (3" x 3" x 1/4")	38 mm x 38 mm x 6.4 mm (1 1/2" x 1 1/2" x 1/4")	610 mm (24")	127 mm x 76 mm x 111 mm (5" x 3" x 3/8")
15.5 mm-18.5 mm (51'-60')							127 mm x 76 mm x 111 mm (5" x 3" x 3/8")					127 mm x 76 mm x 111 mm (5" x 3" x 3/8")					127 mm x 76 mm x 111 mm (5" x 3" x 3/8")
18.6 mm-21.5 mm (61'-70')							127 mm x 76 mm x 111 mm (5" x 3" x 3/8")					127 mm x 76 mm x 111 mm (5" x 3" x 3/8")					127 mm x 76 mm x 111 mm (5" x 3" x 3/8")
21.6 mm-24.6 mm (71'-80')							127 mm x 76 mm x 111 mm (5" x 3" x 3/8")					127 mm x 76 mm x 111 mm (5" x 3" x 3/8")					127 mm x 76 mm x 111 mm (5" x 3" x 3/8")
24.7 mm-27.6 mm (81'-90')							127 mm x 89 mm x 12.7 mm (5" x 3 1/2" x 1/2")					127 mm x 89 mm x 12.7 mm (5" x 3 1/2" x 1/2")					127 mm x 89 mm x 12.7 mm (5" x 3 1/2" x 1/2")
27.7 mm-30.7 mm (91'-100')	762 mm (30")	127 mm x 89 mm x 15.9 mm (5" x 3 1/2" x 5/8")	76 mm x 76 mm x 7.9 mm (3" x 3" x 5/8")	76 mm x 76 mm x 6.4 mm (3" x 3" x 1/4")	38 mm x 38 mm x 6.4 mm (1 1/2" x 1 1/2" x 1/4")	762 mm (30")	127 mm x 89 mm x 15.9 mm (5" x 3 1/2" x 5/8")	89 mm x 89 mm x 7.9 mm (3 1/2" x 3 1/2" x 5/8")	89 mm x 89 mm x 7.9 mm (3 1/2" x 3 1/2" x 5/8")	38 mm x 38 mm x 6.4 mm (1 1/2" x 1 1/2" x 1/4")	762 mm (30")	127 mm x 89 mm x 15.9 mm (5" x 3 1/2" x 5/8")	89 mm x 89 mm x 7.9 mm (3 1/2" x 3 1/2" x 5/8")	101.6 mm x 89 mm x 7.9 mm (4" x 3 1/2" x 5/8")	51 mm x 51 mm x 6.4 mm (2" x 2" x 1/4")	762 mm (30")	127 mm x 89 mm x 15.9 mm (5" x 3 1/2" x 5/8")
30.8 mm-33.7 mm (101'-110')		152 mm x 102 mm x 14.3 mm (6" x 4" x 5/8")					152 mm x 102 mm x 14.3 mm (6" x 4" x 5/8")					152 mm x 102 mm x 14.3 mm (6" x 4" x 5/8")					152 mm x 102 mm x 14.3 mm (6" x 4" x 5/8")
33.8 mm-36.8 mm (111'-120')		152 mm x 102 mm x 15.9 mm (6" x 4" x 5/8")					152 mm x 102 mm x 15.9 mm (6" x 4" x 5/8")					152 mm x 102 mm x 15.9 mm (6" x 4" x 5/8")					152 mm x 102 mm x 15.9 mm (6" x 4" x 5/8")
36.9 mm-40.4 mm (121'-132')		178 mm x 102 mm x 19.0 mm (7" x 4" x 3/4")					178 mm x 102 mm x 19.0 mm (7" x 4" x 3/4")					178 mm x 102 mm x 19.0 mm (7" x 4" x 3/4")					178 mm x 102 mm x 19.0 mm (7" x 4" x 3/4")
40.5 mm-44.2 mm (133'-145')		203 mm x 102 mm x 22.2 mm (8" x 4" x 3/4")					203 mm x 102 mm x 22.2 mm (8" x 4" x 3/4")					203 mm x 102 mm x 22.2 mm (8" x 4" x 3/4")					203 mm x 102 mm x 22.2 mm (8" x 4" x 3/4")

TABLE XXIII

2540 mm (100") Panel Depth						2794 mm (110") Panel Depth						2286 mm (90") Panel Depth					
Span	Frame Width	Chord L's	Vertical L's	Diagonal L's	Wind Bracing L's	Frame Width	Chord L's	Vertical L's	Diagonal L's	Wind Bracing L's	Frame Width	Chord L's	Vertical L's	Diagonal L's	Wind Bracing L's	Frame Width	Chord L's
12.2 mm-15.4 mm (40'-50')	610 mm (24")	127 mm x 76 mm x 111 mm (5" x 3" x 3/8")	76 mm x 76 mm x 7.9 mm (3" x 3" x 5/8")	76 mm x 76 mm x 6.4 mm (3" x 3" x 1/4")	38 mm x 38 mm x 6.4 mm (1 1/2" x 1 1/2" x 1/4")	610 mm (24")	127 mm x 76 mm x 111 mm (5" x 3" x 3/8")	89 mm x 89 mm x 7.9 mm (3 1/2" x 3 1/2" x 5/8")	89 mm x 89 mm x 7.9 mm (3 1/2" x 3 1/2" x 5/8")	38 mm x 38 mm x 6.4 mm (1 1/2" x 1 1/2" x 1/4")	610 mm (24")	127 mm x 76 mm x 111 mm (5" x 3" x 3/8")	89 mm x 89 mm x 7.9 mm (3 1/2" x 3 1/2" x 5/8")	101.6 mm x 89 mm x 7.9 mm (4" x 3 1/2" x 5/8")	51 mm x 51 mm x 6.4 mm (2" x 2" x 1/4")	762 mm (30")	127 mm x 76 mm x 111 mm (5" x 3" x 3/8")
15.5 mm-18.5 mm (51'-60')							127 mm x 89 mm x 15.9 mm (5" x 3 1/2" x 5/8")					127 mm x 89 mm x 15.9 mm (5" x 3 1/2" x 5/8")					127 mm x 89 mm x 15.9 mm (5" x 3 1/2" x 5/8")
18.6 mm-21.5 mm (61'-70')							127 mm x 89 mm x 15.9 mm (5" x 3 1/2" x 5/8")					127 mm x 89 mm x 15.9 mm (5" x 3 1/2" x 5/8")					127 mm x 89 mm x 15.9 mm (5" x 3 1/2" x 5/8")
21.6 mm-24.6 mm (71'-80')							127 mm x 89 mm x 15.9 mm (5" x 3 1/2" x 5/8")					127 mm x 89 mm x 15.9 mm (5" x 3 1/2" x 5/8")					127 mm x 89 mm x 15.9 mm (5" x 3 1/2" x 5/8")
24.7 mm-27.6 mm (81'-90')		127 mm x 89 mm x 15.9 mm (5" x 3 1/2" x 5/8")					127 mm x 89 mm x 15.9 mm (5" x 3 1/2" x 5/8")					127 mm x 89 mm x 15.9 mm (5" x 3 1/2" x 5/8")					127 mm x 89 mm x 15.9 mm (5" x 3 1/2" x 5/8")
27.7 mm-30.7 mm (91'-100')	762 mm (30")	152 mm x 102 mm x 14.3 mm (6" x 4" x 5/8")	76 mm x 76 mm x 7.9 mm (3" x 3" x 5/8")	76 mm x 76 mm x 6.4 mm (3" x 3" x 1/4")	38 mm x 38 mm x 6.4 mm (1 1/2" x 1 1/2" x 1/4")	762 mm (30")	152 mm x 102 mm x 14.3 mm (6" x 4" x 5/8")	89 mm x 89 mm x 7.9 mm (3 1/2" x 3 1/2" x 5/8")	89 mm x 89 mm x 7.9 mm (3 1/2" x 3 1/2" x 5/8")	38 mm x 38 mm x 6.4 mm (1 1/2" x 1 1/2" x 1/4")	762 mm (30")	152 mm x 102 mm x 14.3 mm (6" x 4" x 5/8")	89 mm x 89 mm x 7.9 mm (3 1/2" x 3 1/2" x 5/8")	101.6 mm x 89 mm x 7.9 mm (4" x 3 1/2" x 5/8")	51 mm x 51 mm x 6.4 mm (2" x 2" x 1/4")	762 mm (30")	152 mm x 102 mm x 14.3 mm (6" x 4" x 5/8")
30.8 mm-33.7 mm (101'-110')		152 mm x 102 mm x 15.9 mm (6" x 4" x 5/8")					152 mm x 102 mm x 15.9 mm (6" x 4" x 5/8")					152 mm x 102 mm x 15.9 mm (6" x 4" x 5/8")					152 mm x 102 mm x 15.9 mm (6" x 4" x 5/8")
33.8 mm-36.8 mm (111'-120')		178 mm x 102 mm x 19.0 mm (7" x 4" x 3/4")					178 mm x 102 mm x 19.0 mm (7" x 4" x 3/4")					178 mm x 102 mm x 19.0 mm (7" x 4" x 3/4")					178 mm x 102 mm x 19.0 mm (7" x 4" x 3/4")
36.9 mm-40.4 mm (121'-132')		203 mm x 102 mm x 22.2 mm (8" x 4" x 3/4")					203 mm x 102 mm x 22.2 mm (8" x 4" x 3/4")					203 mm x 102 mm x 22.2 mm (8" x 4" x 3/4")					203 mm x 102 mm x 22.2 mm (8" x 4" x 3/4")
40.5 mm-44.2 mm (133'-145')		203 mm x 102 mm x 22.2 mm (8" x 4" x 3/4")					203 mm x 102 mm x 22.2 mm (8" x 4" x 3/4")					203 mm x 102 mm x 22.2 mm (8" x 4" x 3/4")					203 mm x 102 mm x 22.2 mm (8" x 4" x 3/4")

NOTES

1. Frame widths shown are nominal. These widths may be varied by 6 mm (1/4") to standardize fabrication methods.

2. For View F-F, see S400

3. For Section K-K, see S408

4. For Foundation Details, see S39

5. For General Notes, see S1

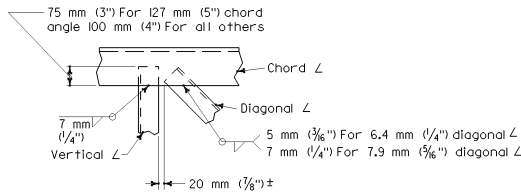
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGN - BOX BEAM CLOSED TRUSS - TWO POST TYPE FRAME MEMBERS

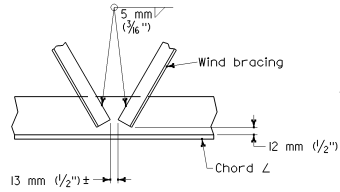
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NO SCALE

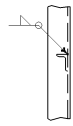
S40AA



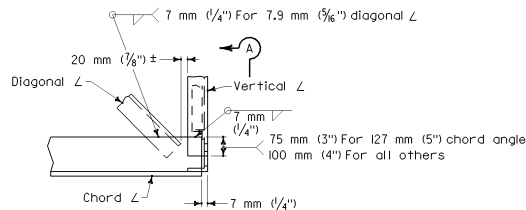
DETAIL 11



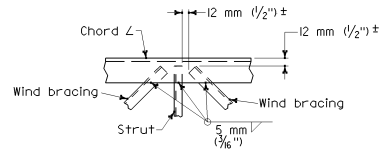
DETAIL 12



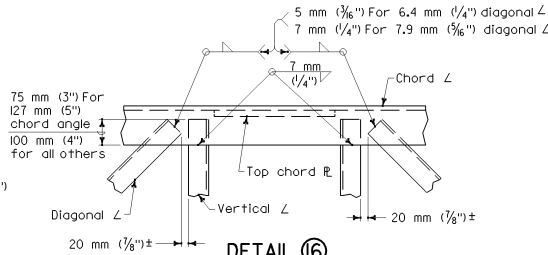
DETAIL 13



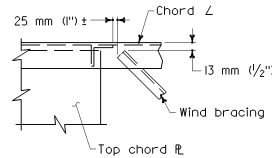
DETAIL 14



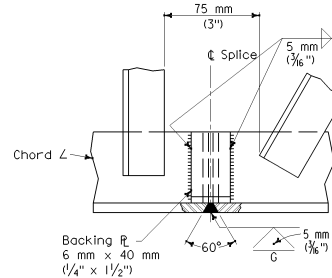
DETAIL 15



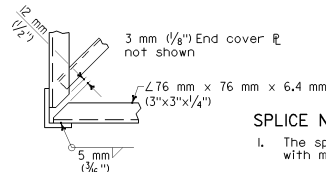
DETAIL 16



DETAIL 17



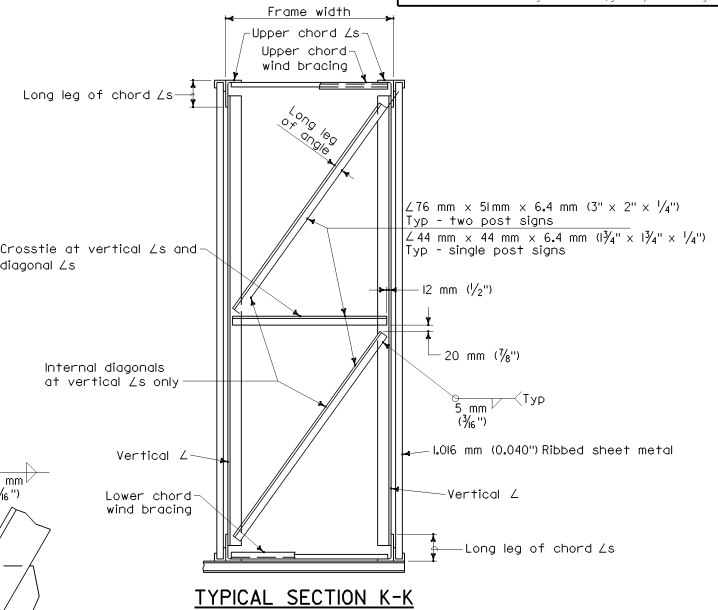
WELD CHORD SPLICE



SECTION A-A

SPLICE NOTES:

- The splice shall be located so as not to interfere with mounting the walkway brackets.
- Alternative splice details may be used if approved by the Engineer.



TYPICAL SECTION K-K

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**OVERHEAD SIGNS-BOX BEAM
CLOSED TRUSS
SINGLE AND TWO POST TYPE
GENERAL FRAME DETAILS**

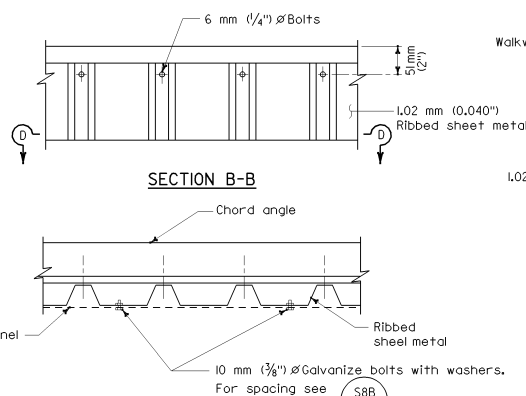
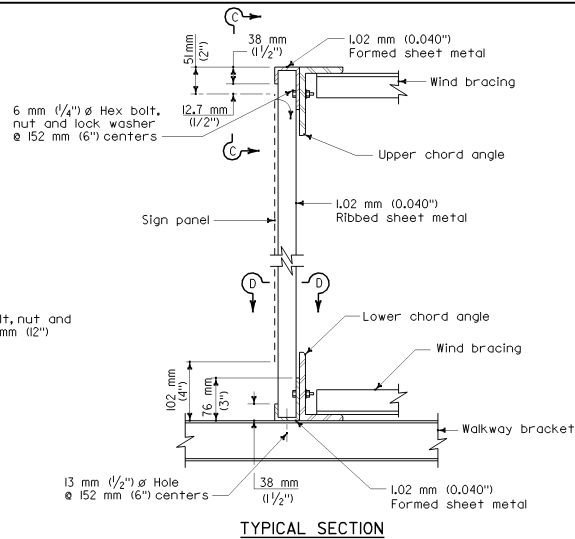
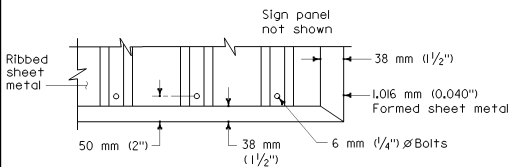
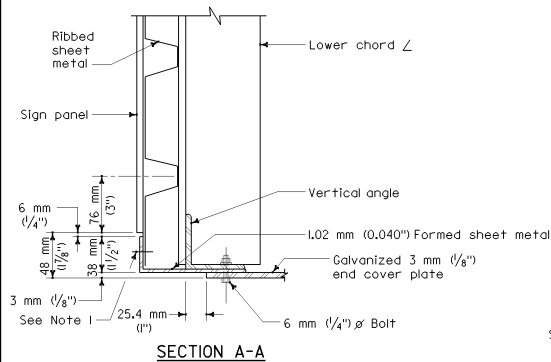
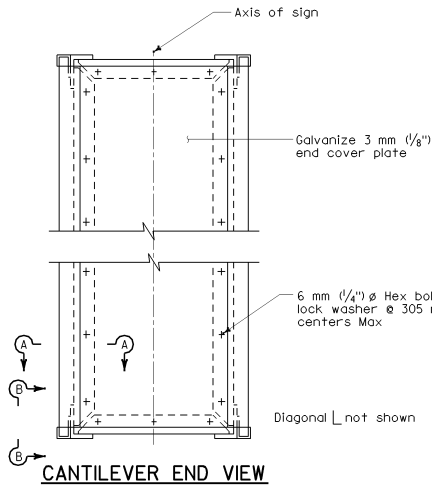
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NO SCALE

S40B

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
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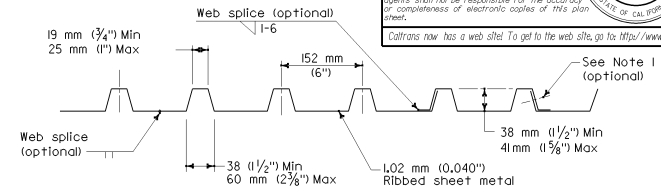


MOUNTING DETAILS FOR OVERHEAD FORMED PANELS

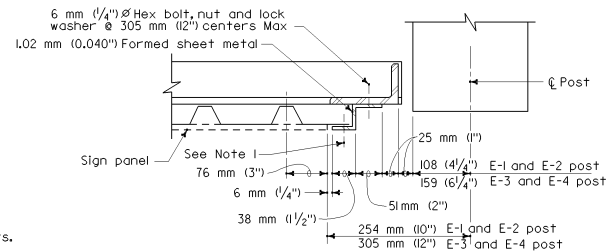
NOTES

- Approved blind rivets 5 mm (3/16") diameter @ 152 mm (6") centers.
- For mounting details of laminated panel signs see Panel shall cover ribbed sheet metal by 76 mm (3") or more.

S8C



HORIZONTAL SECTION AT POST TWO POST TYPE



HORIZONTAL SECTION AT POST CANTILEVER TYPE

OVERHEAD SIGNS-BOX BEAM CLOSED TRUSS RIBBED SHEET METAL DETAILS

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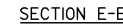
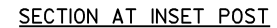
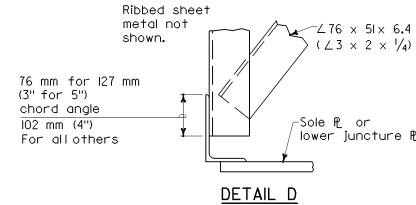
NO SCALE

S40C

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

Jeffrey B. Woody
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 No. C41260
 Exp. 3-31-03
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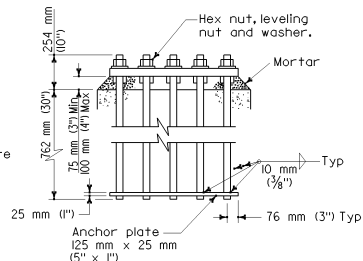
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S 40D

[Return to Table of Contents](#)



ANCHORAGE DETAILS

Diagram of a welded T-joint showing dimensions and labels:

- pipe size table
- Post =
- Varies
- Flange "A"
- 127 mm (5")
- 180 mm
- 254 mm (10")
- 6.35 mm (1/4") Web plate
- Plate 10 mm x 254 mm (3/8" x 10")
- Axis of sign
- 5 mm (1/16")
- Flange "A"

[illegible]

Post = C Web

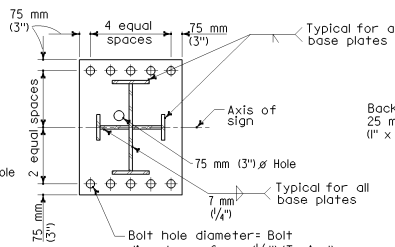
For pipe size see table

Post plate

204 mm (8") 204 mm (8")

SECTION F-F

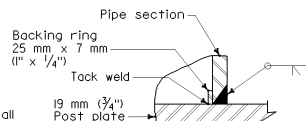
Locate 75 mm (3") ϕ hole for conduit in quadrant away from approaching traffic-center 51 mm (2") from web plates.



PIPE SECTION
TO POST PLATE

TYPICAL BASE PLATES

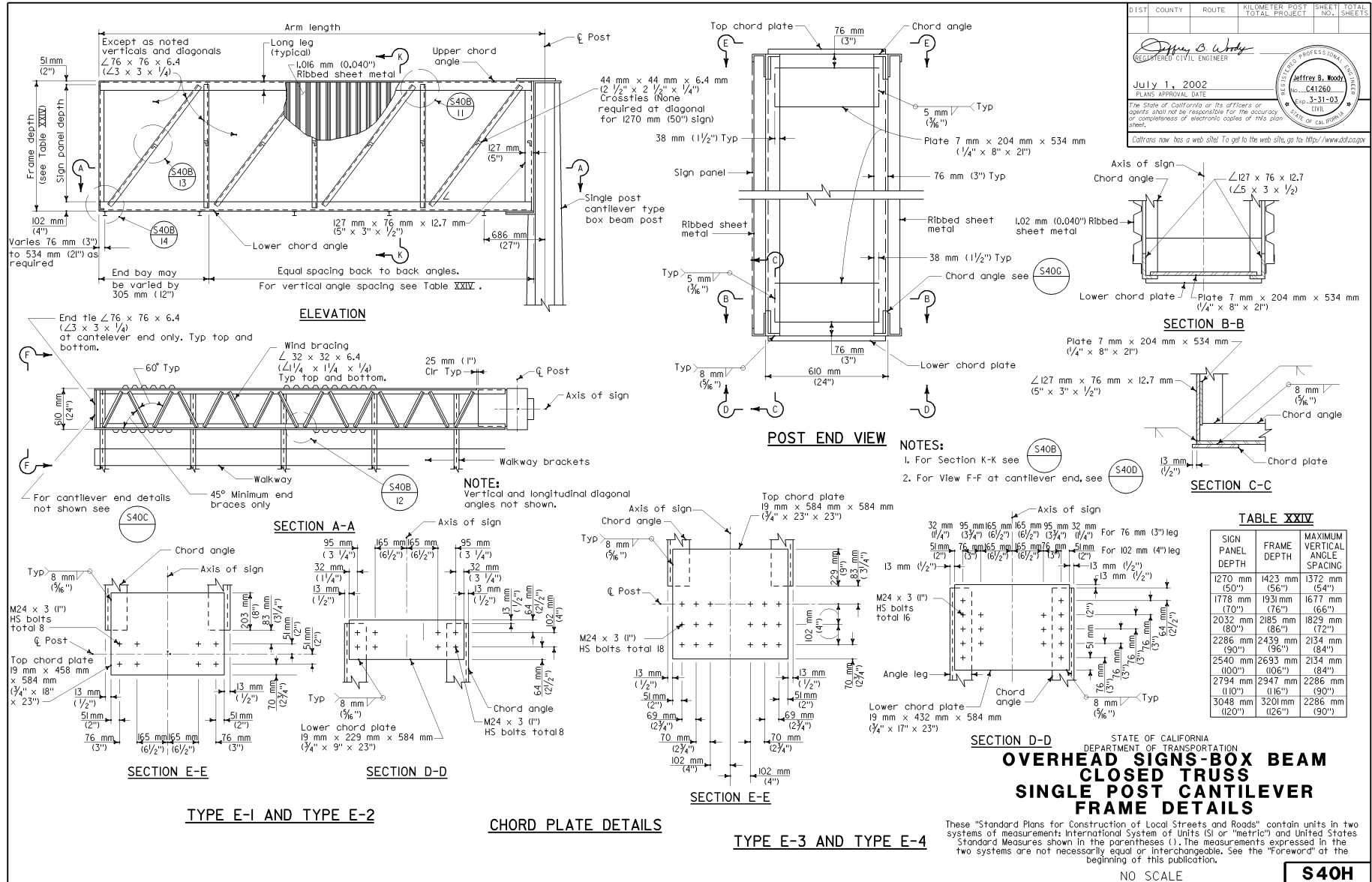
1. Thread upper 260 mm (10") of anchor bolts and galvanize upper 305 mm (12").
2. Anchor plates may be retained with Hex nut or formed head.
3. 64 mm (2 1/2") \varnothing Anchor bolts may be substituted for 57 mm (2 1/4") \varnothing bolts.
4. For foundation details see (539)



STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**OVERHEAD SIGNS-BOX BEAM
CLOSED TRUSS-TWO POST TYPE
POST DETAILS**

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S 40F



DIST COUNTY ROUTE KILOMETER POST SHEET TOTAL
TOTAL PROJECT NO. SHEETS

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REGISTERED CIVIL ENGINEER
No. 441260
DATE 3-31-03
STATE OF CALIFORNIA

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STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**SIGNS-BOX BEAM
BED TRUSS
ST CANTILEVER
STRUCTURE DETAILS**

of Local Streets and Roads" contain units in two
System of Units (SI or "metric") and United States
parentheses (). The measurements expressed in the
ual or interchangeable. See the "Foreword" at the
ing of this publication.

NO SCALE

\$401



0.8 mm ($\frac{1}{32}$ " Min - 6 mm ($\frac{1}{4}$ " Max when lower
juncture plates are in contact.
Shim to 0.8 mm ($\frac{1}{32}$ " Max clearance before
bolts are tightened.

Top chord plate
19 mm x 584 mm x 584 mm
($\frac{3}{4}$ " x 23" x 23")

Post

Shim

19 mm ($\frac{3}{4}$ " Top
post plate

25 mm (1")

305 mm
(12")

13 mm ($\frac{1}{2}$ "
Typ

8 mm
($\frac{5}{8}$ "

635 mm (25")

13 mm ($\frac{1}{2}$ "
M24 x 3 (1")

Handhole and cover plate
centered on
axis of sign.
See S40J

SECTION C-C



TYPE E-1 AND E-2 POST



LOWER JUNCTION CONNECTION

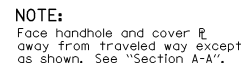


DEPARTMENT OF TRANSPORTATION
OVERHEAD SIGNS-BOX BEAM
CLOSED TRUSS
SINGLE POST CANTILEVER
FRAME JUNCTURE DETAILS

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NO SCALE

S40 I

[illegible]

Handhole 305 mm (12") from top of truss. Opening may be widened to 127 mm x 127 mm (5" x 5") and cover to 165 mm x 165 mm (6½" x 6½")

**HOLE AND
ANCHOR DETAIL**

Hex nut, leveling nut and washer

Anchor bolt U254 Galvanize 305 mm (12")

25.4 mm (1")

762 mm (30")

95 mm (3 7/8")

76 mm (3")

E-1 & E-2 Plate

E-3 & E-4 Plate

Anchor \varnothing 25.4 mm x L 127 mm

NOTE:
Anchor R's may be retained with hex nuts or formed heads.

SINGLE SIDE BOLT

[illegible]

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**OVERHEAD SIGNS-BOX BEAM
CLOSED TRUSS
SINGLE POST CANTILEVER
POST DETAILS**

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NO SCALE

S40J

DIST.	COUNTY	ROUTE	KILOMETER	POST	SHEET	TOTAL
					NO.	SHEET

Jeffrey B. Woody
REGISTERED CIVIL ENGINEER

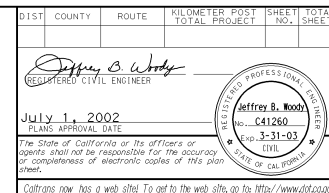
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REGISTERED PROFESSIONAL ENGINEER
Jeffrey B. Woody
No. C41260
Exp. 3-31-03
CIVIL
STATE OF CALIFORNIA

Left arm length may be shorter, longer or equal to right arm length.



Left arm may be shorter, longer or equal to right arm length.

19 mm ($\frac{3}{4}$ ") Top chord R_L

25 (1")

6.4 mm ($\frac{1}{4}$ ") Top and bottom

mm ($\frac{1}{2}$ ") Typ

mm (0.040) Ribbed sheet metal

Red

Sign panel

5 mm ($\frac{3}{16}$ ") Typical

1.02 mm (0.040) Ribbed sheet metal

Vertical 89 mm x 89 mm 7.9 mm ($\frac{3}{2}$ ") x ($\frac{3}{2}$ ") x ($\frac{3}{16}$ ") Tot 4 adjacent to post

38 ($\frac{1}{2}$ ") Typical

5 mm ($\frac{3}{16}$ ")

6.4 mm x 254 mm x 508 mm ($\frac{1}{4}$ ") x 10" x 20"

Chord angle See S40G

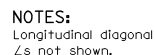
19 mm ($\frac{3}{4}$ ") Sole R_L

See Detail "D"

7 mm ($\frac{1}{4}$ ")

TABLE XXV

Sign Panel Depth	Frame Depth	Maximum Vertical Angle Spacing	Arm Length	No diagonals required
1778 mm (70")	1931 mm (76")	1677 mm (66")	1219 mm (48")	
2032 mm (80")	2185 mm (86")	1829 mm (72")	1524 mm (60")	
2286 mm (90")	2439 mm (96")	2134 mm (84")	1524 mm (60")	
2540 mm (100")	2693 mm (106")	2134 mm (84")	1829 mm (72")	
2794 mm (110")	2947 mm (116")	2286 mm (90")	1829 mm (72")	
3048 mm (120")	3201 mm (126")	2286 mm (90")	1829 mm (72")	

[illegible]

Top = 6.4 mm x 152 mm x 508 mm
(1/4" x 6" x 20")
Bottom = 6.4 mm x 254 mm x 508 mm (1/4" x 10" x 20")

SIGN DEPTH 2540 (100")-3048 (120")

1. For Detail (11) thru (14) and Section K-K, see (S40B)
2. For View F-F at cantilever end, see (S40D)

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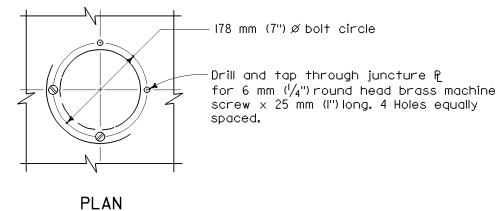
**OVERHEAD SIGNS-BOX BEAM
CLOSED TRUSS
SINGLE POST BUTTERFLY
FRAME DETAILS**

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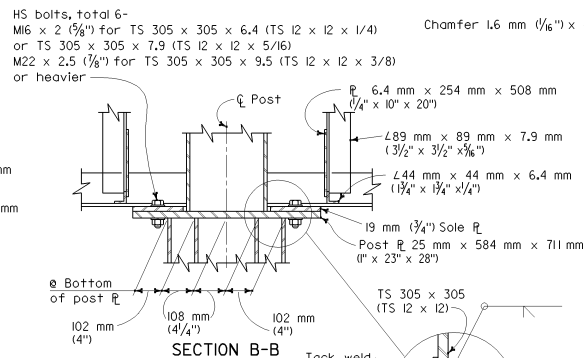
NO SCALE

\$40K

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEET
------	--------	-------	---------------------------------	--------------	----------------

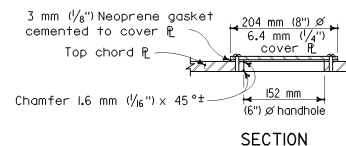


UPPER JUNCTURE CONNECTION

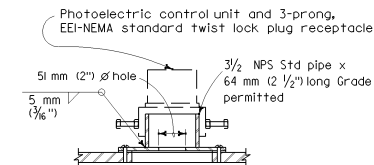


LOWER JUNCTURE CONNECTION

NOTE:
Lower connection plates shall be machined or
straightened after welding to provide full
contact between faying surfaces before bolting.



SECTION



BOLT ACCESS HOLE

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

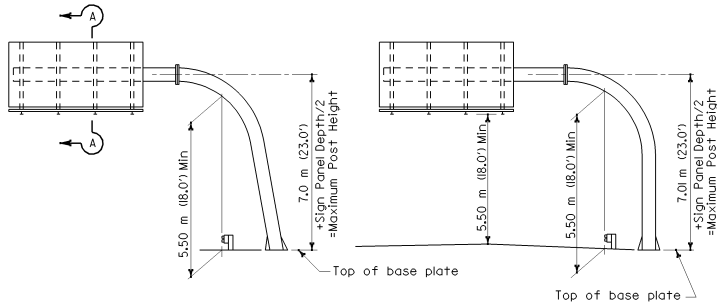
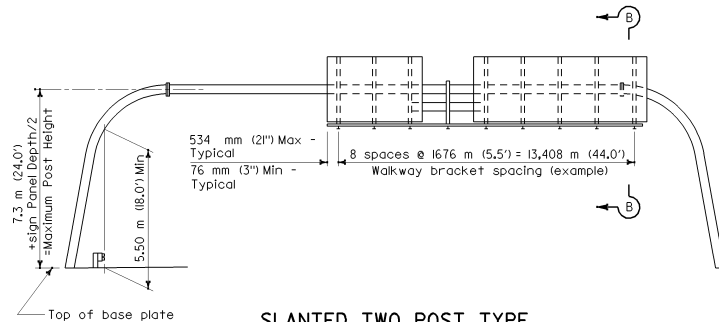
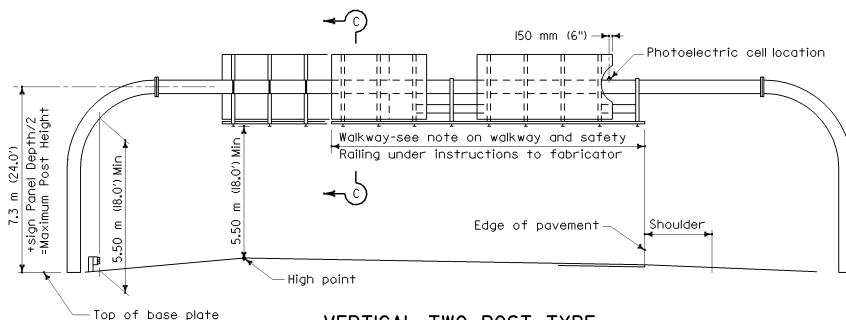
**OVERHEAD SIGNS-BOX BEAM
CLOSED TRUSS
SINGLE POST BUTTERFLY
FRAME JUNCTURE DETAILS**

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NO SCALE

S 40L



**SLANTED SINGLE POST TYPE****VERTICAL SINGLE POST TYPE****SLANTED TWO POST TYPE****VERTICAL TWO POST TYPE****INSTRUCTIONS TO FABRICATOR**

Format sheet shows:

1. Sign structure location.
2. Length of structure span.
3. Panel size and location on structure.
4. Post height to bottom of panel or mast arm elevation.
5. Base plate elevation.
6. Photoelectric cell location if required.
7. Walkway location.

INDEX

1. Instructions and examples.
2. Single post type - layout and pipe selection.
3. Two post type - layout and pipe selection.
4. Structural frame details No. 1.
5. Structural frame details No. 2.
6. Walkway details
7. Safety railing and cable details
8. Foundation details.

WALKWAY BRACKETS:

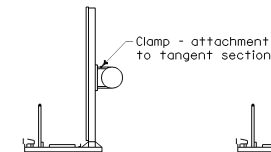
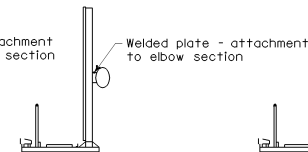
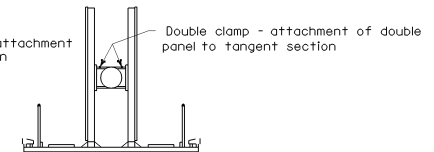
Maintain uniform spacing where possible.
Maximum spacing shall not exceed 1.68 m (66")
Minimum clear to field splice = 305 mm (12") ±

WALKWAY AND SAFETY RAILING:

Walkway to extend full length of sign area and be continuous between signs. Extend walkway to edge of pavement if required. Safety railing to protect entire walkway.

PHOTOELECTRIC CELL:

Place behind sign panel nearest right shoulder unless otherwise shown on format sheet.

**SECTION A-A****SECTION B-B****SECTION C-C**

STATE OF CALIFORNIA
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**OVERHEAD SIGNS-TUBULAR
INSTRUCTIONS AND
EXAMPLES**

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NO SCALE

S40N

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
July 1, 2002 PLANS APPROVAL DATE					
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REGISTERED PROFESSIONAL ENGINEER
 Jeffrey B. Woody
 No. C41260
 Exp. 3-31-03
 STATE OF CALIFORNIA

NOTES:

Specifications:

Design: A.A.S.H.T.O. Standard Specifications for Structural and Supports for Highway Signs, Luminaires and Traffic Signals 1994.

Wind dynamics and resultant fatigue life were analyzed using Department of Transportation program WEFELS as modified by structure Design.

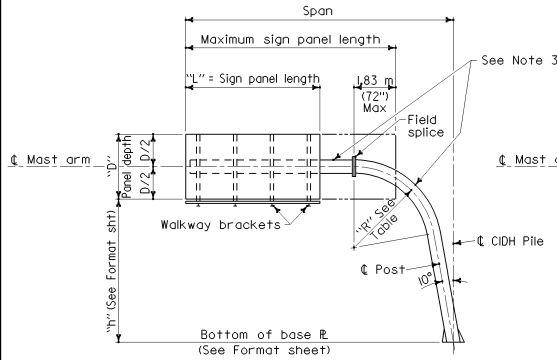
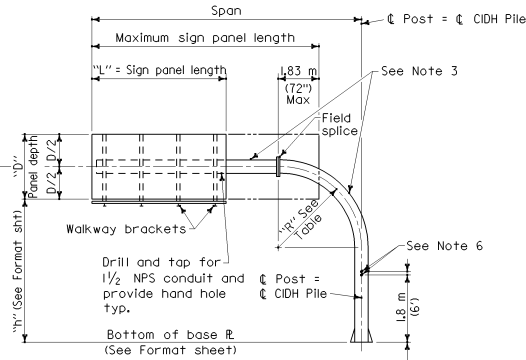
Construction: Standard specifications and the special provisions.

Wind loading: 129 km/h (80 mph) velocity.

Soil pressure: .086 MPa (1,800 psf)

Minimum vertical clearance: 5.50 m (18.0') above roadway and shoulders.

Welding: All welding continuous unless otherwise noted on the plans. All welding to be done in accordance with the Standard Specifications.

**SLANTED POST CANTILEVER****VERTICAL POST CANTILEVER****PIPE SELECTION PROCEDURE**

- Enter table to proper column with known panel depth "D" and appropriate height "h".
- Read down column to desired span length.
- Determine Pipe Post "Dia" and "R" for elbow by reading to the left horizontally.

NOTES:

- The maximum sign panel overlap onto the post elbow shall not exceed 1.83 m (72.0") from the field splice.
- When several sign panels are to be installed with a space between the panels, the space shall be as small as possible and 610 mm (24.0") maximum.
- All posts between base plate and field splice are extra strong pipe. All mast arms are standard pipe.
- During sign erection the post shall be raked as necessary with the use of the leveling nuts to make the sign panel level.
- At final position of post all top and bottom anchor bolt nuts shall be wrench tightened against base plate.
- Drill and tap for 1 1/2 NPS chase nipples and plug with recessed pipe plugs. Place perpendicular to sign panel axis and away from approaching traffic. See Standard Plan ES-32A.
- NPS - Nominal Pipe Size

		MAXIMUM SPAN						
TYPE	PIPE POST		"D" mm (in)	1778 mm (70")	2032 mm (80.0")	2286 mm (90.0")	2540 mm (100.0")	2794 mm (110.0")
	"R"	Dia NPS	"h" m (ft)	<7.01m (23.0')	<7.01m (23.0')	<7.01m (23.0')	<7.01m (23.0')	<7.01m (23.0')
D	2.44 m (8.0')	12	Span m (ft)	5.8 m (19.0')	5.8 m (19.0')	5.7 m (18.7')	5.4 m (17.7')	5.1 m (16.7')
G	2.44 m (8.0')	14		6.1 m (20.0')	6.1 m (20.0')	6.1 m (20.0')	5.9 m (19.4')	5.6 m (18.4')
K	2.44 m (8.0')	16		7.0 m (23.0')	7.0 m (23.0')	7.0 m (23.0')	6.9 m (22.6')	6.6 m (21.7')
N	2.44 m (8.0')	18		8.8 m (28.9')	8.8 m (28.9')	8.4 m (27.6')	7.9 (25.9')	7.5 m (24.6')
R	2.44 m (8.0')	20		9.8 m (32.2')	9.8 m (32.2')	9.3 m (30.5')	8.8 m (28.9')	8.4 m (27.6')
T	3.05 m (10.0')	24		11.6 m (38.1')	11.6 m (38.1')	11.0 m (36.1')	10.4 m (34.1')	9.8 m (32.2')

DIST	COUNTY	ROUTE	KILOMETER TOTAL PROJECT	POST NO.	SHEET NO.	TOTAL SHEETS
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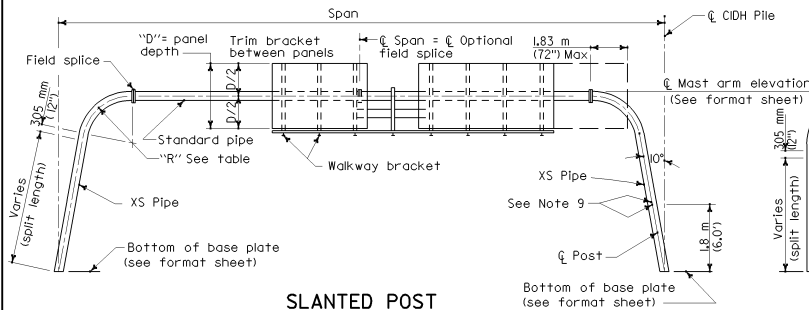
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

**OVERHEAD SIGNS-TUBULAR
SINGLE POST TYPE
LAYOUT AND PIPE SELECTION**

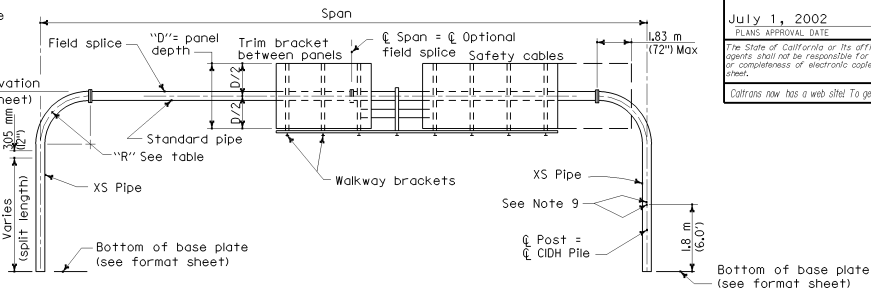
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NO SCALE

S40P



SLANTED POST



VERTICAL POST

SLANTED POSTS TABLE

(See Note 2)

PIPE POST DATA			"D" →	(See Note 2)					
"R"	* Dia (NPS)	Split†		1778 mm (70")	2032 mm (80")	2286 mm (90")	2540 mm (100")	2794 mm (110")	3048 mm (120")
2.44 m (8')	8	127 mm (5")	Span m (ft)	(A) 5.2 m-17.4 m (50'-57')	(A) 5.2 m-17.4 m (50'-57')				
2.44 m (8')	10	102 mm (4") 52 mm (6")		(A) 17.5 m-20.4 m (58'-67')	(A) 17.5 m-20.4 m (58'-67')	(A) 5.2 m-20.4 m (50'-67')	(A) 5.2 m-20.4 m (50'-67')	(A) 5.2 m-18.3 m (50'-60')	(A) 5.2 m-17.4 m (50'-57')
2.44 m (8')	12	102 mm (4") 204 mm (8")		(B) 20.5 m-23.5 m (68'-77')	(B) 20.5 m-23.5 m (68'-77')	(B) 20.5 m-23.5 m (68'-77')	(B) 20.5 m-23.5 m (68'-77')	(B) 18.4 m-21.9 m (61'-72')	(B) 17.5 m-21.3 m (58'-70')
2.44 m (8')	14	102 mm (4") 204 mm (8")		(B) 23.6 m-27.1 m (78'-89')	(B) 23.6 m-27.1 m (78'-89')	(C) 23.6 m-27.1 m (78'-89')	(C) 23.6 m-26.5 m (78'-87')	(B) 22.0 m-25.9 m (73'-85')	(B) 21.4 m-25.3 m (71'-83')
2.44 m (8')	16	102 mm (4") 204 mm (8")		(B) 27.2 m-30.5 m (90'-100')	(B) 27.2 m-30.5 m (90'-100')	(C) 27.2 m-30.5 m (90'-100')	(C) 26.6 m-30.5 m (88'-100')	(C) 26.0 m-28.3 m (86'-93')	(C) 25.4 m-28.3 m (84'-93')
3.05 m (10')	18	127 mm (5") 204 mm (8")		(B) 30.6 m-33.5 m (100'-110')	(B) 30.6 m-33.5 m (100'-110')	(C) 30.6 m-33.5 m (100'-110')	(C) 30.6 m-33.5 m (100'-110')	(C) 28.4 m-32.6 m (94'-107')	(C) 28.4 m-32.0 m (94'-105')
3.05 m (10')	20	127 mm (5")		(B) 33.6 m-36.6 m (110'-120')	(B) 33.6 m-36.6 m (110'-120')	(C) 33.6 m-36.6 m (110'-120')	(C) 33.6 m-36.6 m (110'-120')	(C) 32.7 m-35.1 m (108'-115')	(C) 32.1 m-33.5 m (106'-110')
3.66 m (12')	24	127 mm (5")		(C) 36.7 m-42.7 m (121'-140')	(C) 36.7 m-42.7 m (121'-140')	(C) 36.7 m-42.7 m (121'-140')	(C) 36.7 m-42.7 m (121'-140')	(C) 35.2 m-42.7 m (116'-140')	(C) 35.2 m-41.1 m (116'-135')

* Mast arm diameter same as post. ○ Indicates camber type, see table.

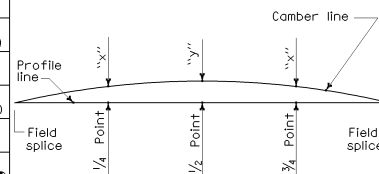
① May increase to 44.2 m (145') with total panel coverage limited to 22.9 m (75') camber type ⑥

NOTES:

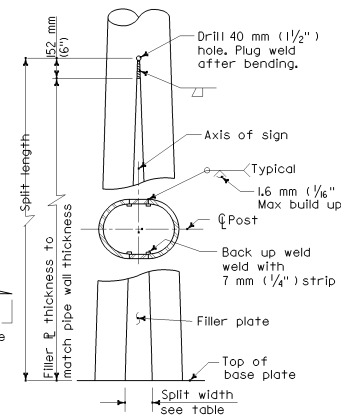
- The maximum sign panel overlap onto elbow shall not exceed 1.83 m (6.0') from the field splice.
- For vertical post type, add 2.44 m (8.0') to the vertical post span and the table for slanted post type. This adjusted span (vertical span + 2.44 m (8.0')) shall not exceed the maximum span shown in the table.
- When several sign panels are to be installed with spaces between the panels the total sign panel length is the sum of the individual sign panel lengths only.
- Maximum total sign panel coverage = 70% of slanted post span, 80% of vertical post span for spans up to 33.5 m (110') above 33.5 m (110'), varies on a straight line to 60% of vertical post span at 42.7 m (140').
- All posts between base plate and field splice are extra strong pipe. All mast arms are standard pipe.
- Before any portion of the sign frames are assembled in their final positions the Contractor shall demonstrate to the Engineer by preassembly or other approved methods that the span lengths of the frames in the no load condition match within 13 mm (42.7)± the field measured span lengths between foundations.
- If the sign frames are erected as one unit, they shall be adequately suspended to avoid distortions or changes in span length between base plates.
- At final position of post, all top and bottom anchor bolt nuts shall be wrench tightened against base plate.
- Drill and tap for 1/2" NPS chase nipples and plug with recessed pipe plugs. Place perpendicular to sign panel axis and away from approaching traffic. See Standard Plan ES-15C.
- Maximum difference between post heights on an individual frame = 1.5 m (5').
- For standard pipe members (Mast Arms) with lengths greater than 24 m (80') an optional field splice will be permitted at 1/4 of span to facilitate hauling operations.
- NPS = Nominal Pipe Size.

CAMBER

Type	"X"	"Y"
(A)	38 mm (1 1/2")	51 mm (2")
(B)	57 mm (2 1/4")	76 mm (3")
(C)	70 mm (2 3/4")	102 mm (4")
(D)	89 mm (3 1/2")	127 mm (5")
(E)	114 mm (4 1/2")	152 mm (6")



CAMBER DIAGRAM



POST SPLIT DETAILS

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**OVERHEAD SIGNS-TUBULAR
TWO POST TYPE
LAYOUT AND PIPE SELECTION**

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NO SCALE

S40Q

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REGISTERED CIVIL ENGINEER

Jeffrey B. Woody

REGISTERED PROFESSIONAL ENGINEER

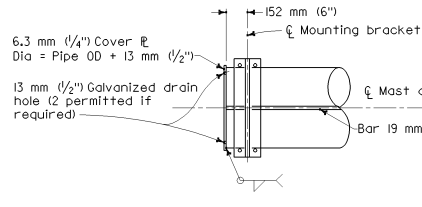
Jeffrey B. Woody

No. C41260

Exp. 3-31-03

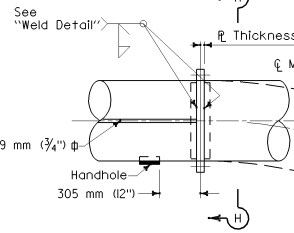
STATE OF CALIFORNIA





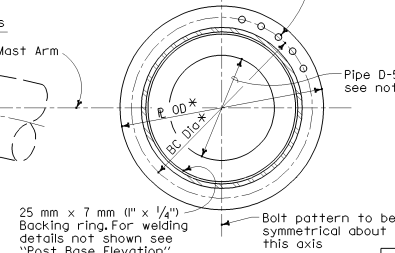
MAST ARM END DETAIL
(For "Single Post Type" only)

SHOP SPLICE



FIELD SPLICE

ATSM A-325M H.S. bolts (galvanized) equally spaced (Direct Tension Indicator Method)
Torque to tension of:
91 kN (20 k) for M16 x 2 (5/8")
142 kN (29 k) for M20 x 2.5 (3/4")
176 kN (39 k) for M22 x 2.5 (1 1/8")
See table for other details



SECTION H-H

FIELD SPLICE					
Pipe Diameter NPS	Thickness	H.S. Bolts	* BC Diameter	* R OD	
8	29 mm (1 1/8")	13-M16 x 2 (5/8")	285 mm (11 1/4")	350 mm (13 3/4")	
10	32 mm (1 1/4")	20-M16 x 2 (5/8")	340 mm (13 3/4")	405 mm (16")	
12	32 mm (1 1/4")	17-M20 x 2.5 (3/4")	390 mm (15 3/8")	455 mm (18")	
14	32 mm (1 1/4")	19-M20 x 2.5 (3/4")	420 mm (16 1/2")	485 mm (19")	
16	32 mm (1 1/4")	22-M20 x 2.5 (3/4")	470 mm (18 1/2")	535 mm (21")	
18	35 mm (1 3/8")	26-M20 x 2.5 (3/4")	520 mm (20 1/2")	585 mm (23")	
20	35 mm (1 3/8")	29-M20 x 2.5 (3/4")	570 mm (22 1/2")	635 mm (25")	
24	38 mm (1 1/2")	26-M22 x 2.5 (1 1/8")	690 mm (27")	780 mm (30 3/4")	

* See note 4

NOTE:

Design based on capacity of standard pipe.

NOTES:

- Place single thin bead of silicone caulking compound around hole prior to bolting. Caulking not to interfere with friction between plates in bolted area.
- Prime and paint post interior from base R to 152 mm (6") above lower handhole-unless post is galvanized.
- "D" is inside diameters of "extra strong pipe".
- Field splice diameters marked "*" may be increased 51mm (2") to facilitate bolting.

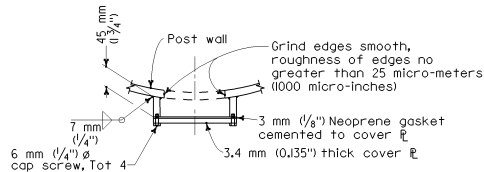
NPS = Nominal Pipe Size

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION OVERHEAD SIGNS-TUBULAR STRUCTURAL FRAME DETAILS NO.2

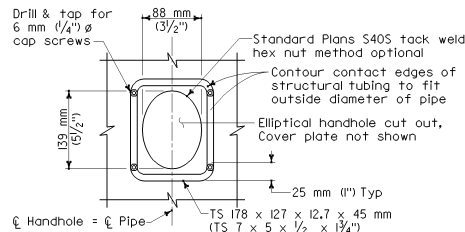
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NO SCALE

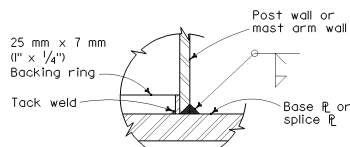
S40S



PLAN

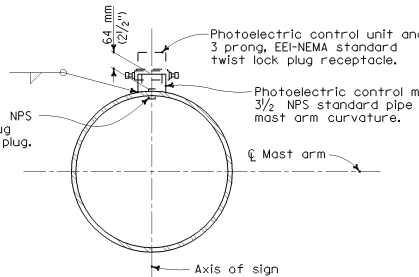


ELEVATION TYPICAL DETAILS OF HANDHOLE AND COVER



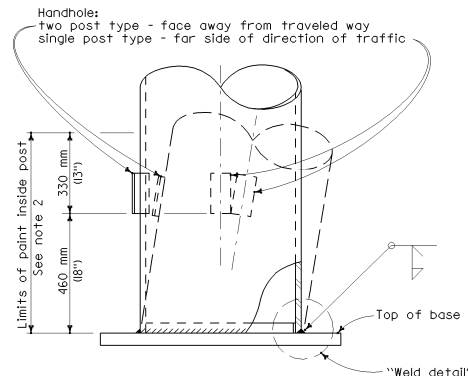
WELD DETAIL

Drill and tap for 3/4" NPS chase nipple and plug with recessed pipe plug.



PHOTOELECTRIC CONTROL DETAILS

(See "Layout" sheet for location when required)

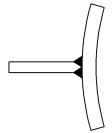


POST BASE ELEVATION

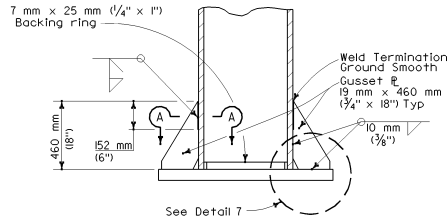
(For base R details see "Basic Plate and Anchorage Detail" sheet)

Post Type	*Nominal Pipe Size (NPS)	Split	Base R Size	Bolt Circle	Anchor Bolts Dia
A	8 x-s	127 mm (5")	690 mm x 64 mm (27" x 2 1/2")	584 mm (23")	6-57 mm (2 1/4")
B	10 x-s	102 mm (4")	690 mm x 64 mm (27" x 2 1/2")	584 mm (23")	6-57 mm (2 1/4")
C	10 x-s	152 mm (6")	760 mm x 64 mm (30" x 2 1/2")	635 mm (25")	8-57 mm (2 1/4")
D	12 x-s	-	660 mm x 64 mm (26" x 2 1/2")	559 mm (22")	8-57 mm (2 1/4")
E	12 x-s	102 mm (4")	760 mm x 64 mm (30" x 2 1/2")	635 mm (25")	8-57 mm (2 1/4")
F	12 x-s	204 mm (8")	810 mm x 70 mm (32" x 2 3/4")	686 mm (27")	8-57 mm (2 1/4")
G	14 x-s	-	690 mm x 64 mm (27" x 2 1/2")	584 mm (23")	8-57 mm (2 1/4")
H	14 x-s	102 mm (4")	810 mm x 70 mm (32" x 2 3/4")	686 mm (27")	8-57 mm (2 1/4")
J	14 x-s	204 mm (8")	910 mm Dia x 70 mm (36" x 2 3/4")	737 mm (29")	10-57 mm (2 1/4")
K	16 x-s	-	760 mm x 64 mm (30" x 2 1/2")	635 mm (25")	8-57 mm (2 1/4")
L	16 x-s	102 mm (4")	910 mm Dia x 70 mm (36" x 2 3/4")	737 mm (29")	10-57 mm (2 1/4")
M	16 x-s	204 mm (8")	1020 mm Dia x 76 mm (40" x 3")	838 mm (33")	12-64 mm (2 1/2")
N	18 x-s	-	810 mm x 70 mm (32" x 2 3/4")	686 mm (27")	8-57 mm (2 1/4")
O	18 x-s	127 mm (5")	1020 mm Dia x 76 mm (40" x 3")	838 mm (33")	12-64 mm (2 1/2")
P	18 x-s	204 mm (8")	1020 mm Dia x 76 mm (40" x 3")	838 mm (33")	12-64 mm (2 1/2")
R	20 x-s	-	910 mm Dia x 70 mm (36" x 2 3/4")	737 mm (29")	10-57 mm (2 1/4")
S	20 x-s	127 mm (5")	1020 mm Dia x 76 mm (40" x 3")	838 mm (33")	12-64 mm (2 1/2")
T	24 x-s	-	1020 mm Dia x 76 mm (40" x 3")	838 mm (33")	12-64 mm (2 1/2")
V	24 x-s	127 mm (5")	1070 mm Dia x 64 mm (40" x 2 1/2")	908 mm (35 3/4")	14-64 mm (2 1/2")

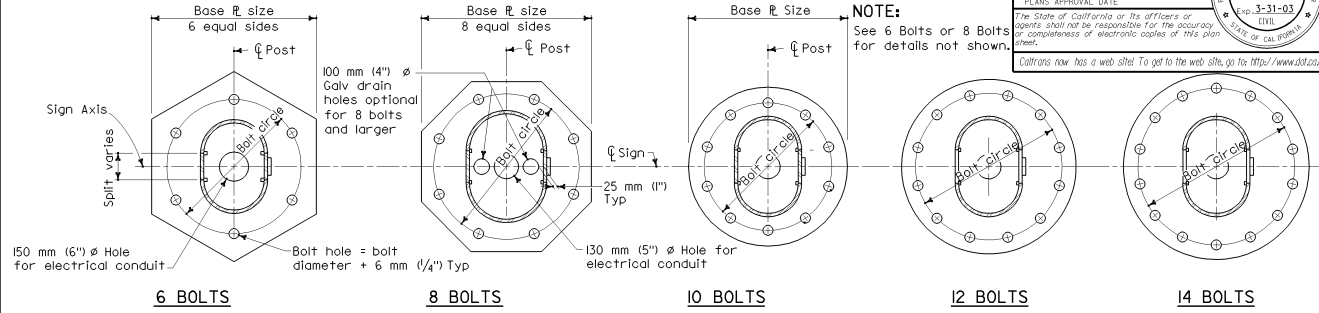
*See Note 6



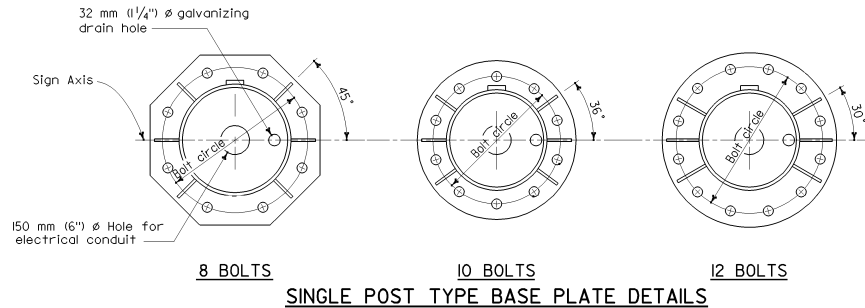
SECTION A-A



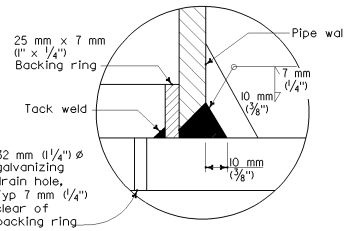
See Detail 7



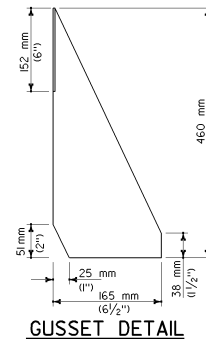
TWO POST TYPE BASE PLATE DETAILS



SINGLE POST TYPE BASE PLATE DETAILS



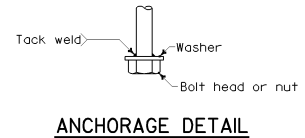
THRU POST @ BASE P (NO COVER P)
DETAIL 7



GUSSET DETAIL

DIST COUNTY ROUTE KILOMETER POST SHEET TOTAL
TOTAL PROJECT NO. SHEETS

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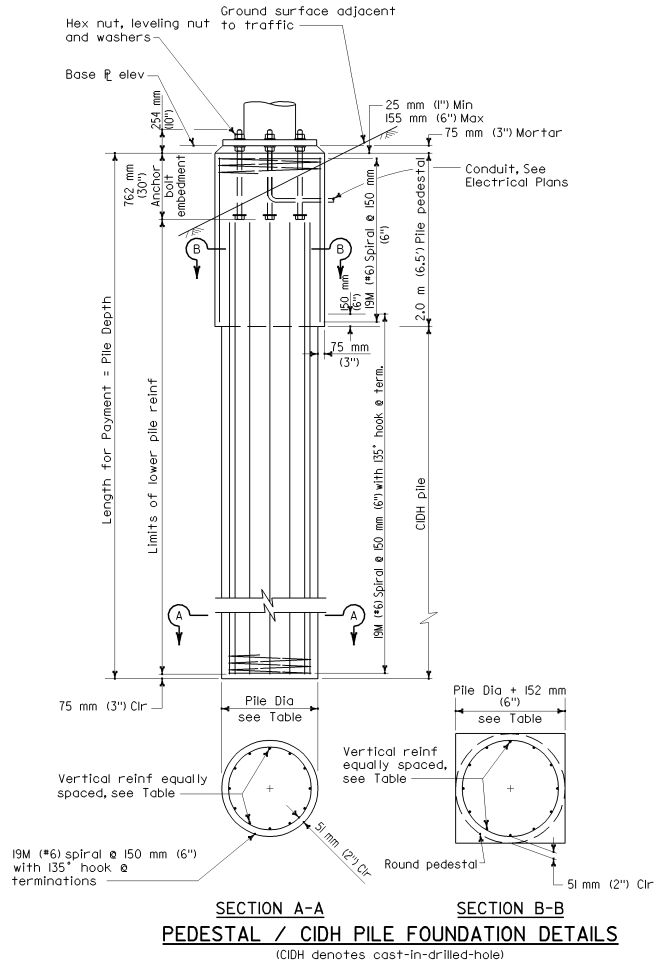
ANCHORAGE DETAIL


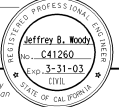
STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION OVERHEAD SIGNS-TUBULAR BASE PLATE AND ANCHORAGE DETAILS

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NO SCALE

S40T



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NOTES:

1. Thread upper 250 mm (10") and galvanize upper 300 mm (12") of the anchor bolts.
2. Pile shall be placed against undisturbed material.
3. Provide bolt template during installation of anchor bolts.
4. Prior to erection of the post, backfill which is equivalent to the surrounding material shall be in place.
5. Pile shall be formed 150 mm (6") minimum below ground surface.
6. Pipe sizes are based on ASTM A53 or A106.
NPS = Nominal Pipe Size.

Post Type	Anchor Bolts Dia	Pile Dia	Vertical Reinf	Pile Depth
A	6-57 mm (2 1/4")	920 mm (36") P	8-29M (#9)	3.4 m (11')
B	6-57 mm (2 1/4")	920 mm (36") P	8-29M (#9)	3.7 m (12')
C	8-57 mm (2 1/4")	920 mm (36") P	11-29M (#9)	4.3 m (14')
D	8-57 mm (2 1/4")	920 mm (36") P	8-29M (#9)	3.7 m (12')
E	8-57 mm (2 1/4")	920 mm (36") P	11-29M (#9)	4.0 m (13')
F	8-57 mm (2 1/4")	920 mm (36") P	12-29M (#9)	4.0 m (13')
G	8-57 mm (2 1/4")	920 mm (36") P	8-29M (#9)	4.0 m (13')
H	8-57 mm (2 1/4")	920 mm (36") P	12-29M (#9)	4.3 m (14')
J	10-57 mm (2 1/4")	920 mm (36") P	15-29M (#9)	5.2 m (17')
K	8-57 mm (2 1/4")	920 mm (36") P	11-29M (#9)	4.3 m (14')
L	10-57 mm (2 1/4")	920 mm (36") P	15-29M (#9)	4.6 m (15')
M	12-64 mm (2 1/2")	1070 mm (42") P	18-29M (#9)	6.7 m (22')
N	8-57 mm (2 1/4")	920 mm (36") P	12-29M (#9)	5.2 m (17')
O	12-64 mm (2 1/2")	1070 mm (42") P	18-29M (#9)	5.8 m (19')
P	12-64 mm (2 1/2")	1070 mm (42") P	18-29M (#9)	6.7 m (22')
R	10-57 mm (2 1/4")	920 mm (36") P	15-29M (#9)	5.8 m (19')
S	12-64 mm (2 1/2")	1070 mm (42") P	18-29M (#9)	6.7 m (22')
T	12-64 mm (2 1/2")	1070 mm (42") P	18-29M (#9)	6.7 m (22')
V	14-64 mm (2 1/2")	1070 mm (42") P	26-29M (#9)	6.7 m (22')

NOTE: 'P' denotes pedestal

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**OVERHEAD SIGNS-TUBULAR
FOUNDATION DETAILS**

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NO SCALE

S40U

ELECTROLIERS

	STANDARD TYPES
	15, 15D ROADWAY
	15 STRUCTURE
	21, 21D STRUCTURE
	22, 22D ROADWAY
	30 ROADWAY
	31 ROADWAY
	32 ROADWAY

- Double arm lighting standard
- Existing electrolier to remain in place unless otherwise specified or indicated.
- Foundation for future electrolier. See Project Notes.

NOTES

- Luminaires shall be 310 W HPS when installed on Type 21, 21D, 22, 22D, 30, 31 and 32 Standards, unless otherwise specified. Luminaires shall be 200 W HPS when installed on all other type standards or poles, unless otherwise specified.
- All luminaires shall be the cutoff type, ANSI Type III medium cutoff lighting distribution, unless otherwise specified.
- Variations noted adjacent to symbol on project plans.

Electrolier (see project notes or project plans)

Luminaire on wood pole

High mast lighting standard

STANDARD NOTES

- AB** Abandon, if applied to conduit, remove conductors.
- BC** Install pull box in existing conduit run.
- BP** Pedestrian barricade, type as indicated on plan.
- CB** Install conduit into existing pull box.
- CC** Connect new and existing conduit. Remove existing conductors and install conductors as indicated.
- CF** Conduit to remain for future use. Remove conductors. Install pull wire or rope.
- DH** Detector handhole. Type A unless otherwise indicated.
- FA** Foundation to be abandoned.
- IS** Install State-furnished sign on signal mast arm.
- NS** No slip base on standard.
- PEC** Photoelectric Control.
- PEU** Photoelectric unit.
- RC** Equipment or material to be removed and become the property of the Contractor.
- RE** Remove electrolier, fuses and ballast. Tape ends of conductors.
- RL** Relocate equipment.
- RR** Remove and reuse equipment.
- RS** Remove and salvage equipment.
- SBI** Install slip base insert.
- SC** Splice new to existing conductors
- SD** Service disconnect.
- SF** Standard to remain for future use. Remove luminaire, pole conductors, fuses and ballast. Tape disconnects.
- TSP** Telephone service point.

SOFFIT AND WALL MOUNTED LUMINAIRES

- Pendant, 70 W HPS unless otherwise specified.
- Flush, 70 W HPS unless otherwise specified.
- Wall surface, 70 W HPS unless otherwise specified.
- Existing soffit or wall luminaire to remain unmodified.
- Existing soffit or wall luminaire to be modified as specified.

NOTE

Arrow indicates "street side" of luminaire or glassware.

ABBREVIATIONS AND EQUIPMENT DESIGNATIONS

PROPOSED	EXISTING	
AC+		An ungrounded conductor
AC-		A grounded conductor
AWG		American wire gage
BC		Bolt circle
C		Conduit
CCTV	cctv	Closed circuit television
CEC	cec	Irrigation controller enclosure cabinet
CKT		Circuit
CMS	cms	Changeable message sign
DLC	dlc	Loop detector lead-in cable
EMS	ems	Extinguishable message sign
EVD	evd	Emergency vehicle cable
FB	fb	Flashing beacon
FBCA	fbca	Flashing beacon control assembly
HAR	har	Highway advisory radio
hex		Hexagonal
HPS	hps	High pressure sodium
ISNS	lisns	Internally illuminated street name sign
LMA	lma	Luminaire mast arm
LPS	lps	Low pressure sodium
LTG	ltg	Lighting
LUM	lum	Luminaire
MC	mc	Mercury contactor
MLC	mlc	Magnetometer detector lead-in cable
M/M	m/m	Multiple to multiple transformer
MT	mt	Conduit with pull wire or rope only
MTG	mtg	Mounting
MV	mv	Mercury vapor lighting fixture
N		Neutral
NC		Normally closed
NO		Normally open
PB	pb	Pull box
PEC	pec	Photoelectric control (Type I, II, III, IV or V as shown)
PED	ped	Pedestrian
PEU	peu	Photoelectric unit
PPB	ppb	Pedestrian push button
RIS		Radio interference suppressor
RL		Relocated equipment
RM	rm	Ramp metering
sbi		Slip base insert
sb		Slip base
SIC	slc	Signal interconnect cable
SIG	sig	Signal
SMA	sma	Signal mast arm
S/M	s/m	Series to multiple transformer
SN		Solid neutral
SNS		Street name sign
SP	sp	Service point
TDC	tdc	Telephone demarcation cabinet
TMS		Traffic monitoring station
VEH	veh	Vehicle
XFMR	xfmr	Transformer

DIST	COUNTY	ROUTE	KILOMETER TOTAL PROJECT	POST NO.	SHEET NO.	TOTAL SHEETS
<div style="text-align: center;"> <p>Theresa A. Gabriel REGISTERED PROFESSIONAL ENGINEER No. 415124 Exp. 6-30-04 ELECTRICAL STATE OF CALIFORNIA</p> </div>						
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EQUIPMENT IDENTIFICATION

ILLUMINATED SIGN IDENTIFICATION NUMBER:

- Sign No. I2345
- 10 MV - Transformer rating (kVA)
- SCI - Sign control type
- LO - Number and type of fixtures
- Do NOT place on standard or structure

ELECTROLIER OR EQUIPMENT IDENTIFICATION NUMBER:

- I2345 - Mast arm length in meters (feet), if shown. Do not place on standard or structure.
- LO - Equipment number - Place on standard or structure. Existing equipment numbers are shown in parenthesis.

CONDUIT AND CONDUCTOR IDENTIFICATION:

- 4(1 1/2" C), 2*10, 15*14, 2 DLC - Number and size of conductors and cables
- ø1, ø2, ø2P, etc. - Size of conduit in millimeters (inches)
- 1 2 3 - Traffic phase identification for signal faces, detectors and phase diagrams
- A B C - Project note numbers
- 1 2 3 - Equipment description, installation or item numbers
- 1 2 3 - Conduit run numbers

SIGNAL AND LIGHTING STANDARD (TYPICAL DESIGNATION):

- I9A - 3 - Wind velocity=129 km/h (80 mph)
- I29 (80) - Case 3 arm loading
- Standard type
- Standard Plan sheet number
- Detail number or letter

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION SIGNAL, LIGHTING AND ELECTRICAL SYSTEMS SYMBOLS AND ABBREVIATIONS

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NO SCALE

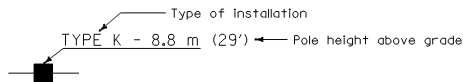
ES-1A

CONDUIT**PROPOSED****EXISTING**

---	---	Conduit-Lighting, unless otherwise indicated or noted
---	---	Traffic signal conduit
-C-	-c-	Communication conduit
-S-	-s-	Sprinkler control conduit
-T-	-t-	Telephone conduit
-F-	-f-	Fire alarm conduit
---	---	Conduit termination (Detail C, ES-9A in structures)
---	---	Conduit riser in structure

SERVICE EQUIPMENT**PROPOSED****EXISTING**

---	---	Overhead lines
U	U	Wood pole "U" indicates utility owned
---	---	Pole guy-with anchor
▲	▲	Pad mount for ground - Mounted utility transformer
---	---	Service equipment enclosure type
---	---	Service equipment enclosure door indicates front of enclosure
T	T	Telephone demarcation cabinet

POLE-MOUNTED SERVICE DESIGNATION**ILLUMINATED OVERHEAD SIGN STRUCTURES****PROPOSED****EXISTING**

---	---	Overhead sign - Single post
---	---	Overhead sign - Two post
---	---	Overhead sign - Mounted on structure
---	---	Overhead sign with roadway electroler attached

SIGNAL EQUIPMENT**PROPOSED****EXISTING**

---	---	Pedestrian signal
---	---	Pedestrian push button post
---	---	Pedestrian barricade
---	---	Vehicle signal face, 3-Section: 200 mm (8") red, yellow and green sections. 300 mm (12") sections for SMA mounted.
---	---	Vehicle signal face with angle visor
---	---	Modifications of basic symbols: "L" indicates all non-arrow sections lowered "L" indicates lowered green section only "PV" indicates 300 mm (12") programmed visibility sections "300" (12") indicates all 300 mm (12") sections
---	---	Vehicle signal face with backplate
---	---	Vehicle signal face with 300 mm (12") red, yellow and green left arrow sections
---	---	Vehicle signal face with 300 mm (12") red and yellow sections and 300 mm (12") up green arrow
---	---	Vehicle signal face (5-Section) with 300 mm (12") yellow and green right arrows and 200 mm (8") red, yellow and green sections
---	---	Type I Standard and attached signals
---	---	Standard with signal mast arm only and attached signals
---	---	Type 33 Standard, Left-turn signal and sign
---	---	Standard with luminaire and signal mast arms and attached signals
---	---	Cantilever flashing beacons Type 9 Frame, unless otherwise specified or indicated
---	---	Flashing beacon, One signal section with 300 mm (12") lens, backplate and visor. "R" indicates red lens, "Y" indicates yellow lens.
---	---	Controller assembly, Door indicates front of cabinet
---	---	Guard post
---	---	Type I Standard-"Meter On" sign

MISCELLANEOUS EQUIPMENT**PROPOSED****EXISTING**

---	---	Changeable message sign
---	---	Closed circuit television
---	---	Highway advisory radio

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
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STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION SIGNAL, LIGHTING AND ELECTRICAL SYSTEMS SYMBOLS AND ABBREVIATIONS These "Standard Plans for Construction of Local Streets and Roads" contain units in two systems of measurement: International System of Units (SI or "metric") and United States Standard Measures shown in the parentheses (). The measurements expressed in the two systems are not necessarily equal or interchangeable. See the "Foreword" at the beginning of this publication.					

PULL BOXES**PROPOSED****EXISTING**

---	---	Pull box-No.5 unless otherwise indicated or noted as below.
---	---	Pull box-Additional designations or descriptions
3	9A(2)	(C) = Communications pull box (E) = Pull box with extension (S) = Sprinkler control pull box (2) = Anchor bolts and conduit for future installation of Type 21 Standard (T) = Traffic pull box
3 = No. 3 1/2 pull box 5 = No. 5 pull box 6 = No. 6 pull box 7 = No. 7 (Ceiling pull box) 8 = No. 8 (Pendant soffit pull box) 9 = No. 9 pull box 9A = No. 9A pull box		

VEHICLE DETECTORS

---	---	Vehicle detector designation
---	---	U = Upper L = Lower
---	---	Slot number in input file
---	---	Input file (I or J)
---	---	Phase
---	---	Inductive loop detector. Outline and location of sawcut shown. (Type A loop illustrated)
---	---	Magnetometer detectors
---	---	Magnetic detector
---	---	Detector handhole Type A unless otherwise specified

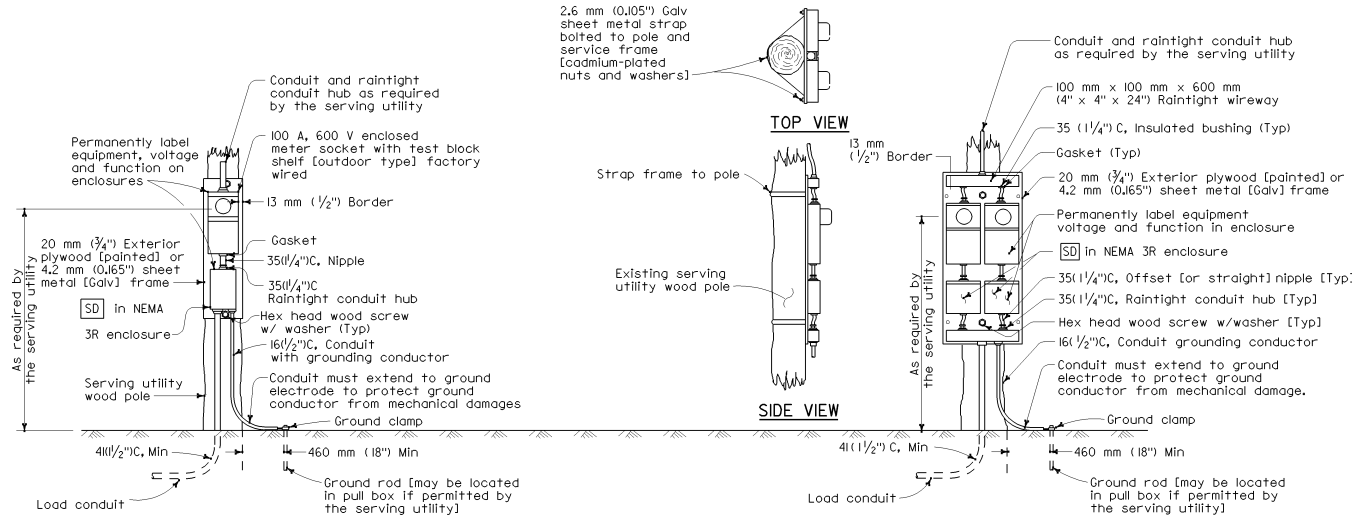
PROPOSED**EXISTING**

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**SIGNAL, LIGHTING AND ELECTRICAL SYSTEMS
SYMBOLS AND ABBREVIATIONS**

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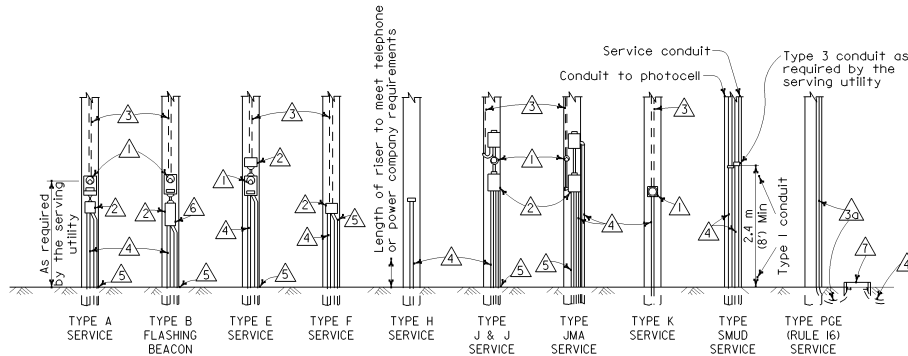
NO SCALE

ES-1B



TYPE SCE-1 SERVICE

TYPE SCE-2 SERVICE

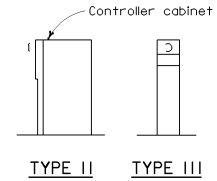


NOTES

- 1. Meter socket.
- 2. Service enclosure 60 A size minimum, unless otherwise shown.
- 3. (a) Utility owned pole, Service riser [and contractor with PEU where required] furnished and installed by the serving utility.
(b) State owned pole, Service riser and all other required equipment furnished and installed by Contractor.
- 4. Conduit, length and size as required.
- 5. Ground conduit, 16 (1/2) C, #6 AWG bare copper. See "Service Grounding" detail.
- 6. Flashing beacon control assembly.
- 7. Service pull box, No. 5 [E] unless otherwise noted, furnished and installed by Contractor. Exact location determined by the serving utility.

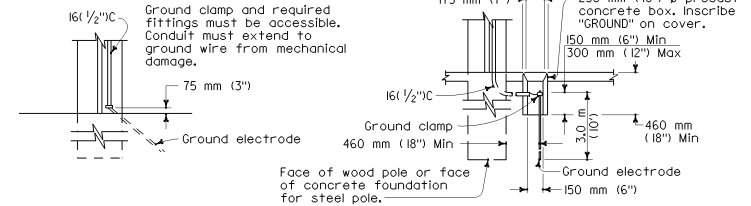
POLE MOUNTED SERVICE INSTALLATIONS

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
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TYPE OF SERVICE (TYPICAL)

Type II service equipment enclosure mounted on a side of a controller cabinet.
Type III complete free-standing service equipment enclosure.



TYPE A

TYPE B

Use where serving utility requires 460 mm (18") clearance between ground rod and pole or service cabinet. Installation shown is for sidewalk or paved areas. In unpaved areas, omit special box and locate ground clamp above ground or locate ground clamp in nearest pull box.

SERVICE GROUNDING


STATE OF CALIFORNIA
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SIGNAL, LIGHTING AND ELECTRICAL SYSTEMS SERVICE EQUIPMENT

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NO SCALE

ES-2A

DIST.	COUNTY	ROUTE	KILOMETER TOTAL PROJECT	POST NO.	SHEET NO.	TOTAL SHEETS

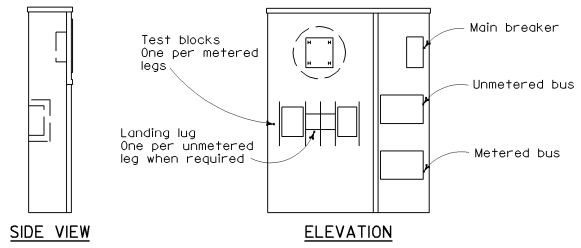


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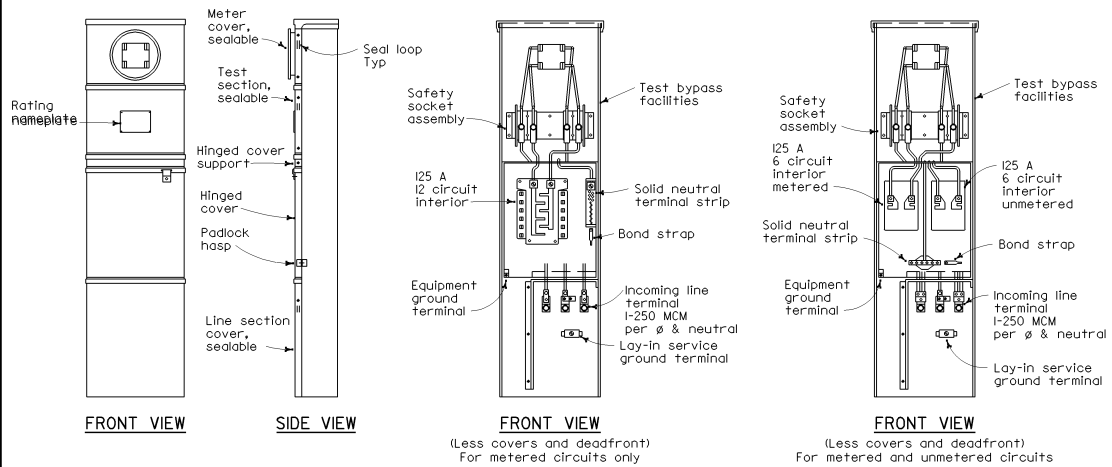
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SIDE VIEW
ELEVATION
TYPE II-A SERVICE EQUIPMENT ENCLOSURE



FRONT VIEW
SIDE VIEW
FRONT VIEW
(Less covers and deadfront)
For metered circuits only
TYPE II-B SERVICE EQUIPMENT ENCLOSURE

NOTES-TYPE II SERVICE EQUIPMENT ENCLOSURES

- Service equipment enclosures and metering equipment shall meet the requirements of the serving utility. When the serving utility provides both metered and unmetered circuits, a separate bus shall be provided for each circuit.
- Service equipment enclosures shall be factory wired and conform to NEMA Standards and to Section 86-2.11, "Service" of the Standard Specifications.
- Service equipment enclosures shall be NEMA 3R construction and shall be provided with dead front panel and provisions for padlocking.
- All control wiring shall be 600 V number 14 stranded machine tool wire. Where subject to flexing, 19 strand wire shall be used.
- All main bus shall be rated for I25 A and shall be tin-plated copper.
- An engraved phenolic nameplate on the dead front panel indicating the function of each circuit breaker or device shall be installed with stainless steel rivets or stainless steel screws:
 - Adjacent to the breaker or device. Character size shall be a minimum of 3 mm (1/8").
 - At top of the exterior door panel indicating system number, voltage level and number of phases. Character size shall be a minimum of 5 mm (3/16").
- A plastic laminated wiring diagram shall be provided and attached to the inside of the front door.
- In unpaved areas, a raised portland cement concrete pad of 600 mm (24") x 100 mm (4") x width of service equipment enclosure foundation or controller cabinet foundation shall be constructed in front of Type II service equipment enclosure.
- Internal bus, where shown, is typical only. Alternative designs of proposed service equipment enclosures shall be submitted to the Engineer for approval.
- Circuit breakers may be mounted in the vertical or horizontal position.
- Dimensions of service equipment enclosures shall meet the requirements of the serving utility.

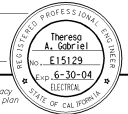
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DEPARTMENT OF TRANSPORTATION
SIGNAL, LIGHTING AND ELECTRICAL SYSTEMS
SERVICE EQUIPMENT
TYPE II SERIES

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NO SCALE

NOTES-TYPE III SERVICE EQUIPMENT ENCLOSURES

1. Service equipment enclosure and metering equipment shall meet the requirements of the serving utility. When the serving utility provides both metered and un-metered circuits, a separate bus shall be provided for each circuit. The meter area shall have a sealable, lockable, raintight cover that can be removed without the use of tools.
2. Service equipment enclosures shall be factory wired and conform to NEMA Standards and to Section 86-2.11, "Service" of the Standard Specifications.
3. Dimensions of service equipment enclosures shall meet the requirements of the serving utility.
4. The dead front panels on Type III-A service equipment enclosures shall have a continuous stainless steel piano hinge. The panel in front of the breakers shall be secured with captive screws; the lower panel shall be secured with a latch or captive screws. No live parts shall be mounted on the dead front panel.
5. The exterior door shall have provisions for padlocking. The padlock hole shall be a minimum diameter of 11 mm ($\frac{7}{16}$ ").
6. Enclosures housing transformers of more than one (1) kVA shall have effective screened ventilation louvers of not less than 32,000 mm² (50 square inches). Screen shall be stainless steel No.304, with a No.10 size mesh. Secure screen after painting with at least four bolts and frame
7. Fasteners on the exterior of the enclosure shall be vandal-resistant and shall not be removable from the exterior. All screws, nuts, bolts and washers shall be stainless steel.
8. All terminals for incoming service conductors shall be compatible with either copper or aluminum conductors sized to suit the conductors shown on the plan. Terminal lugs shall be copper or tin-plated aluminum. Solid neutral terminal strip shall be rated for 125 A unless otherwise specified and for use with copper or aluminum conductors. The terminal shall include but not be limited to:
 - a) Incoming terminals (landing lugs)
 - b) Neutral lugs
 - c) Solid neutral terminal strip
 - d) Terminal strips for conductors within the enclosure.
9. At least 6 standard single pole circuit breaker spaces, 20 mm ($\frac{3}{4}$ ") nominal, shall be provided for branch circuits. Circuit breaker interiors shall be copper. Interiors shall accept plug-in or cable-in/cable-out circuit breakers.
10. All control wiring shall be 600 V, No.14 stranded machine tool wire. Where subject to flexing, 19 strand wire shall be used.
11. Main bus shall be rated for 125 A and shall be tin-plated copper.
12. A plastic laminated wiring diagram shall be provided with brass mounting eyelets and attached to the inside of the enclosure, or the wiring diagram shall be mounted to the interior of the door with an UL or ETL approved method.
13. An engraved phenolic nameplate on the dead front panel indicating the function of each circuit within the enclosure shall be installed with stainless steel rivets or stainless steel screws:
 - a) Adjacent to the breaker or device. Character size shall be a minimum of 3 mm ($\frac{1}{8}$ ").
 - b) At top of the exterior door panel indicating system No., voltage level and number of phases. Character size shall be a minimum of 5 mm ($\frac{3}{16}$ ").
14. The plan shows the approximate location of devices within the enclosure. Components may be rearranged. However, the "working" clearances within the enclosure shall be maintained.
15. In unpaved areas a raised portland cement concrete pad 600 mm (24") x 100 mm (4") x width of foundation shall be constructed in front of new service installation. Pad shall be set to elevation of foundation.
16. Foundation shall extend 50 mm (2") minimum beyond edge of enclosure..
17. Terminate conduits 50 mm (2") maximum above top of foundation.
18. Internal bus, where shown, is typical only. Alternative design of proposed service equipment enclosure shall be submitted to the Engineer for approval.
19. Plug-in circuit breakers may be mounted in the vertical or horizontal position. Cable-in/cable-out circuit breakers shall be mounted in the vertical position.
20. On Type III-AF and Type III-BF service equipment enclosures, the meter viewing windows are located on the front side of the service equipment enclosures.
21. The Type III-AR and Type III-BR service equipment enclosures shall be similarly constructed as Type III-AF and Type III-BF respectively, except the meter viewing window shall be located on the back side of the service equipment enclosure.

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
					
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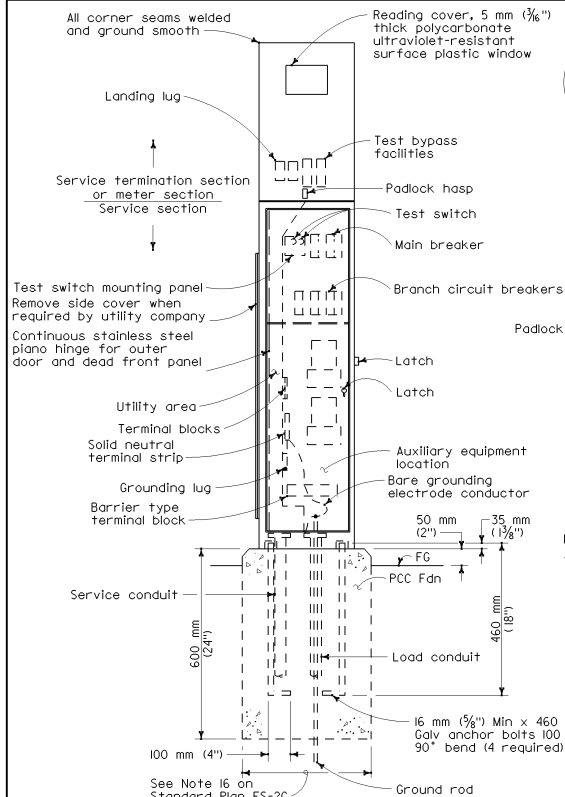
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**SIGNAL, LIGHTING AND
ELECTRICAL SYSTEMS
SERVICE EQUIPMENT NOTES
TYPE III SERIES**

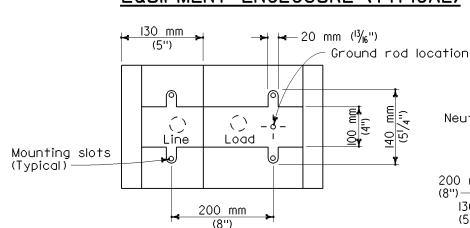
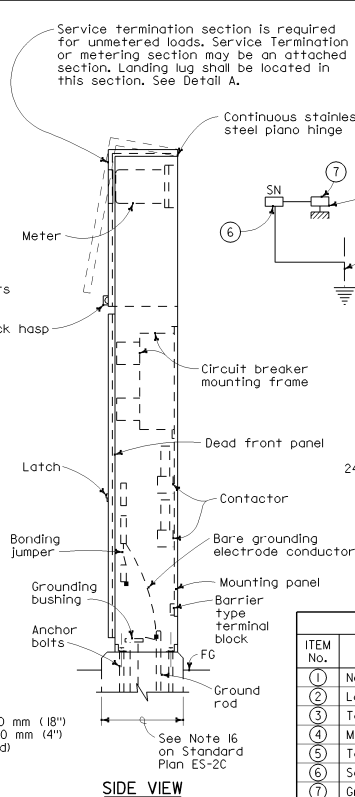
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NO SCALE

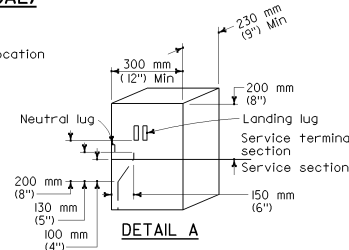
ES-2C



FRONT VIEW

TYPE III-AF SERVICE
EQUIPMENT ENCLOSURE (TYPICAL)BASE FOR TYPE III-A
SERVICE EQUIPMENT ENCLOSURE

SIDE VIEW

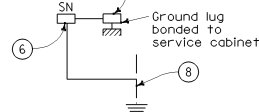


DETAIL A

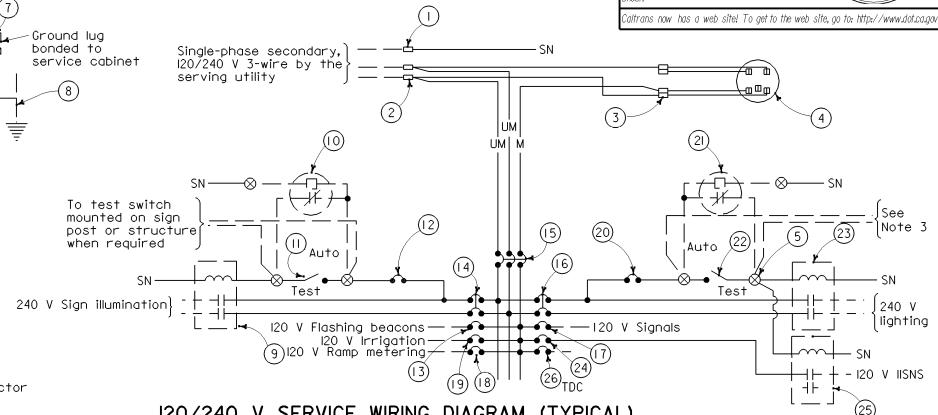
P Pole
CB Circuit breaker
A Ampere
V Volt
M Metered
UM Unmetered
SN Solid neutral
NO Normally open
NC Normally closed

LEGEND

— External conductor
— Conductor or bus
• Tie point
— Contactor coil
— Contactor, Contact NO
— Terminal blocks
— Contactor, Contact NC
— Enclosure bond
— Ground



Single-phase secondary,
120/240 V 3-wire by the
serving utility



120/240 V SERVICE WIRING DIAGRAM (TYPICAL)

TYPE III-A SERVICE (120/240 V) EQUIPMENT LEGEND

ITEM No.	COMPONENT	NAME PLATE DESCRIPTION	ITEM No.	COMPONENT	NAME PLATE DESCRIPTION
(1)	Neutral lug		(14)	30 A, 240 V, 2P, CB	Sign Illumination
(2)	Landing lug		(15)	100 A, 240 V, 3P, CB	Main Breaker
(3)	Test bypass facility		(16)	30 A, 240 V, 2P, CB	Lighting
(4)	Meter socket and support		(17)	50 A, 120 V, IP, CB	Signals
(5)	Terminal blocks		(18)	30 A, 120 V, IP, CB	Ramo Metering
(6)	Solid neutral terminal strip		(19)	20 A, 120 V, IP, CB	Irrigation
(7)	Ground lug		(20)	15 A, 120 V, IP, CB	Lighting Control
(8)	Ground rod		(21)	Photoelectric unit	
(9)	30 A, IP, Test switch	Sign Illumination	(22)	15 A, IP, Test switch	Light Test Switch
(10)	Photoelectric unit		(23)	60 A, 2PNO Contactor	Lighting
(11)	15 A, IP, Test switch	Sign Illumination Test Switch	(24)	15 A, 120 V, IP, CB	ISNS
(12)	15 A, 120 V, IP, CB	Sign Illumination Control	(25)	30 A, 2PNO Contactor	
(13)	15 A, 120 V, IP, CB	Flashing Beacon	(26)	20 A, 120 V, IP, CB	Telephone Demarcation Cabinet

NOTES (FOR SERVICE EQUIPMENT)

- Voltage ratings of service equipment shall conform to the service voltages indicated on the plans.
- Unless otherwise indicated on the plans, all service equipment items shall be provided for each service equipment enclosure as shown.
- Connect to remote test switch mounted on lighting standards, sign post or structure when required.
- Item No. (1) and (6) shall be insulated from the cabinet.
- Meter sockets shall be 5 clip type.

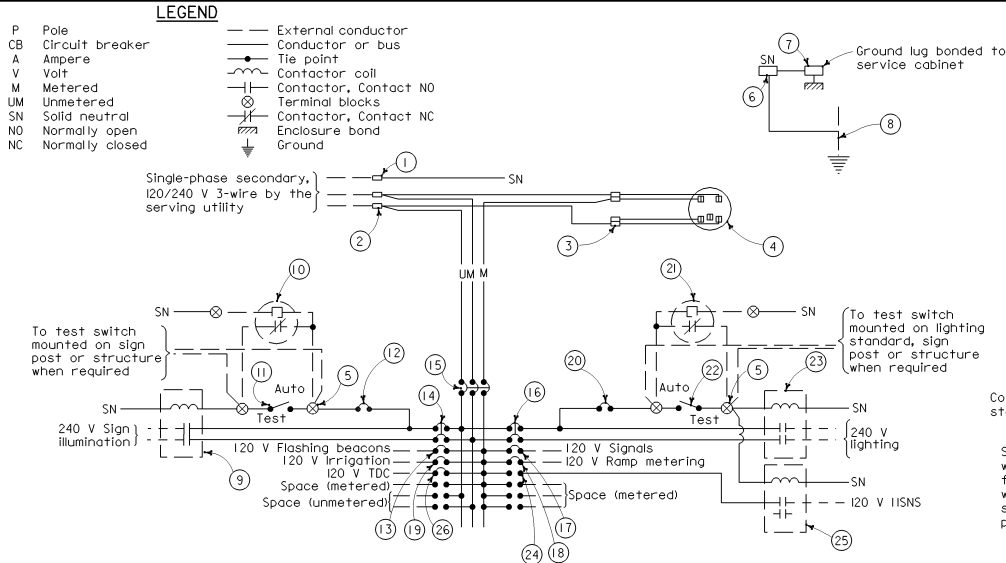
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**SIGNAL, LIGHTING AND
ELECTRICAL SYSTEMS
SERVICE EQUIPMENT AND
TYPICAL WIRING DIAGRAM,
TYPE III-A SERIES**

These "Standard Plans for Construction of Local Streets and Roads" contain units in two systems of measurement: International System of Units (SI or "metric") and United States Standard Measures shown in the parentheses (). The measurements expressed in the two systems are not necessarily equal or interchangeable. See the "Foreword" at the beginning of this publication.

NO SCALE

ES-2D

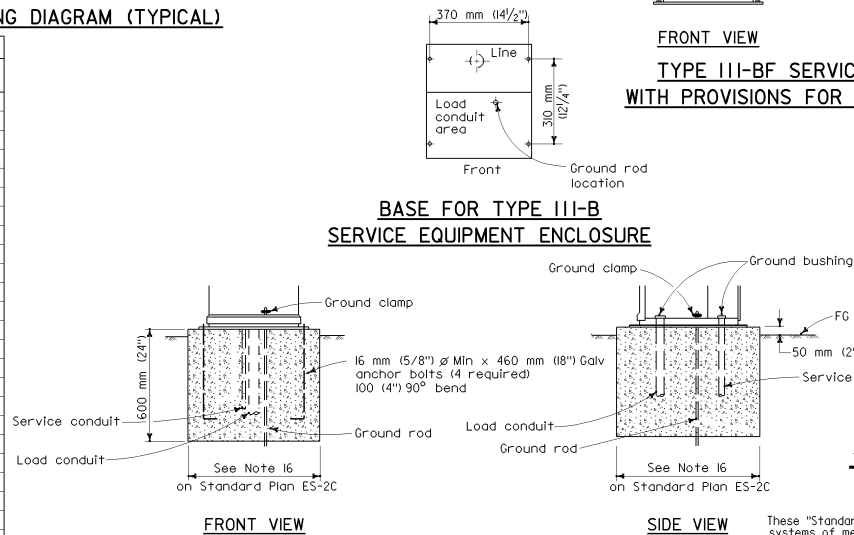
DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
<p>Theresa Gabriel REGISTERED PROFESSIONAL ENGINEER No. E15129 Exp. 6-30-04 STATE OF CALIFORNIA</p> <p>July 1, 2002 PLANS APPROVAL DATE</p> <p>The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.</p> <p>Caltrans now has a web site! To get to the web site, go to https://www.dot.ca.gov</p>					



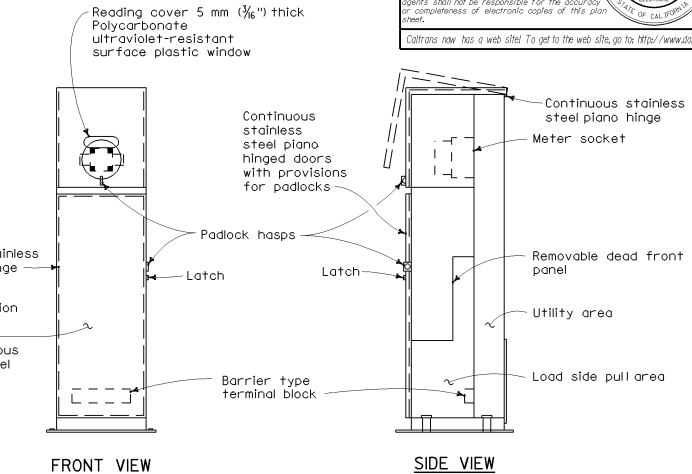
120/240 V SERVICE WIRING DIAGRAM (TYPICAL)

TYPE III-B SERVICE (120/240 V) EQUIPMENT LEGEND

ITEM NO.	COMPONENT	NAME PLATE DESCRIPTION
(1)	Neutral lug	
(2)	Landing lug	
(3)	Test bypass facility	
(4)	Meter socket and support	
(5)	Terminal blocks	
(6)	Solid neutral terminal strip	
(7)	Ground lug	
(8)	Ground rod	
(9)	30 A, 2PNO Contactor	Sign Illumination
(10)	Photoelectric unit	
(11)	15 A, IP, Test switch	Sign Illumination Test Switch
(12)	15 A, 120 V, IP, CB	Sign Illumination Control
(13)	15 A, 120 V, IP, CB	Flashing Beacon
(14)	30 A, 240 V, 2P, CB	Sign Illumination
(15)	100 A, 240 V, 3P, CB	Main Breaker
(16)	30 A, 240 V, 2P, CB	Lighting
(17)	50 A, 120 V, IP, CB	Signals
(18)	30 A, 120 V, IP, CB	Ramp Metering
(19)	20 A, 120 V, IP, CB	Irrigation
(20)	15 A, 120 V, IP, CB	Lighting Control
(21)	Photoelectric unit	
(22)	15 A, IP, Test switch	Lighting Test Switch
(23)	60 A, 2PNO Contactor	Lighting
(24)	15 A, 120 V, IP, CB	IISNS
(25)	30 A, 2PNO Contactor	
(26)	20 A, 120 V, IP, CB	Telephone Demarcation Cabinet



TYPE III-B SERVICE EQUIPMENT ENCLOSURE FOUNDATION DETAILS



TYPE III-BF SERVICE EQUIPMENT ENCLOSURE WITH PROVISIONS FOR ONE 100 A METER (TYPICAL)

NOTES:

(FOR SERVICE EQUIPMENT)

1. Voltage ratings of service equipment shall conform to the service voltages indicated on the plans.
2. Unless otherwise indicated on the plans, all service equipment items shall be provided for each service equipment enclosure as shown.
3. Meter sockets shall be the 5 clip type.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**SIGNAL, LIGHTING AND ELECTRICAL SYSTEMS
SERVICE EQUIPMENT AND
TYPICAL WIRING DIAGRAM
TYPE III - B SERIES**

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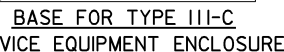
NO SCALE

ES-2E

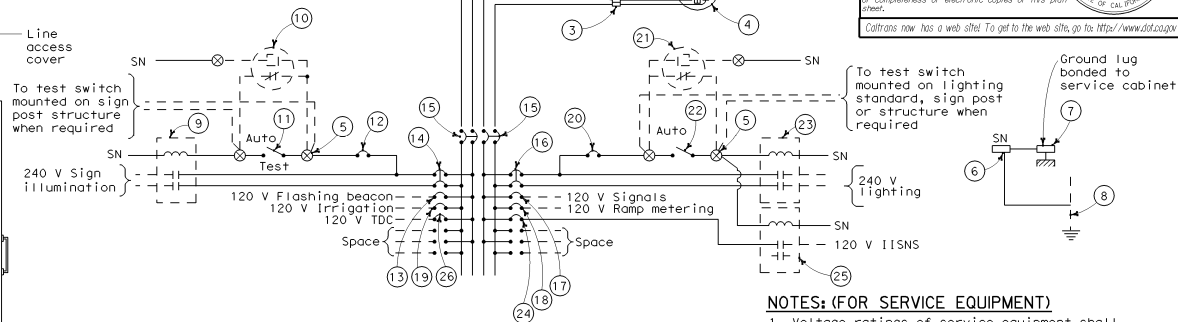
DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
<p>Theresa Gabriel REGISTERED PROFESSIONAL ENGINEER No. E15123 Exp. 6-30-04 STATE OF CALIFORNIA</p> <p>July 1, 2002 PLANS APPROVAL DATE</p> <p>The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.</p> <p>Caltrans now has a web site! To get to the web site, go to: http://www.dot.ca.gov</p>					



SIDE VIEW



Single-phase
secondary, 120/240 V
3 wire service by the
serving utility



NOTES: (FOR SERVICE EQUIPMENT)

1. Voltage ratings of service equipment shall conform to the service voltages indicated on the plans.
2. Unless otherwise indicated on the plans, all service equipment items shall be provided for each service equipment enclosure as shown.
3. Meter sockets shall be 5 Clip Type.

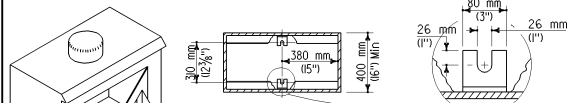
TYPE III-C SERVICE (I20/240 V) EQUIPMENT LEGEND					
ITEM No.	COMPONENT	NAME PLATE DESCRIPTION	ITEM No.	COMPONENT	NAME PLATE DESCRIPTION
(1)	Neutral lug		(14)	30 A,240 V,2P,CB	Sign Illumination
(2)	Landing lug		(15)	100 A,240 V,2P,CB	Main Breaker
(3)	Test bypass facility		(16)	30 A,240 V,2P,CB	Lighting
(4)	Meter socket and support		(17)	50 A,120 V,1P,CB	Signals
(5)	Terminal blocks		(18)	30 A,120 V,1P,CB	Ramp Metering
(6)	Solid neutral terminal strip		(19)	20 A,120 V,1P,CB	Irrigation
(7)	Ground lug		(20)	15 A,120 V,1P,CB	Lighting Control
(8)	Ground rod		(21)	Photoelectric unit	
(9)	30 A,2PNO, Contactor	Sign Illumination	(22)	15 A,1P,Test switch	Lighting Control
(10)	Photoelectric unit		(23)	60 A,2PNO Contactor	Lighting
(11)	15 A,1P, Test switch	Sign Illumination Test Switch	(24)	15 A,120 V,1P,CB	IISNS
(12)	15 A,120 V,1P,CB	Sign Illumination Control	(25)	30 A,2PNO Contactor	IISNS
(13)	15 A,120 V,1P,CB	Flashing Beacon	(26)	20 A,120 V,1P,CB	Telephone Demarcation Cabinet

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**SIGNAL, LIGHTING AND
ELECTRICAL SYSTEMS
SERVICE EQUIPMENT AND
TYPICAL WIRING DIAGRAM
TYPE III - C SERIES**

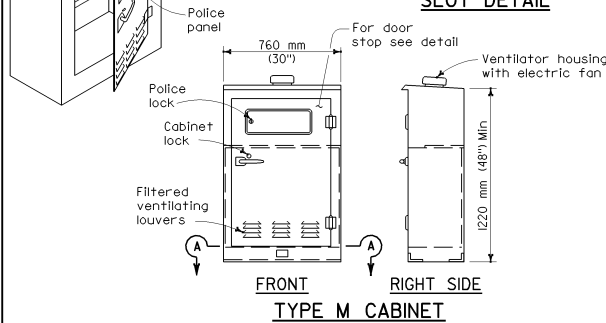
These "Standard Plans for Construction of Local Streets and Roads" contain units in two systems of measurement: International System of Units (SI or "metric") and United States Standard Measures shown in the parentheses (). The measurements expressed in the two systems are not necessarily equal or interchangeable. See the "Foreword" at the beginning of this publication.

NO SCALE

ES-2F



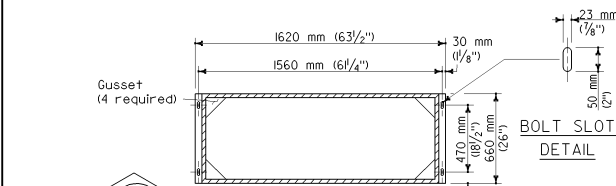
SECTION A-A

ANCHOR BOLT
SLOT DETAIL

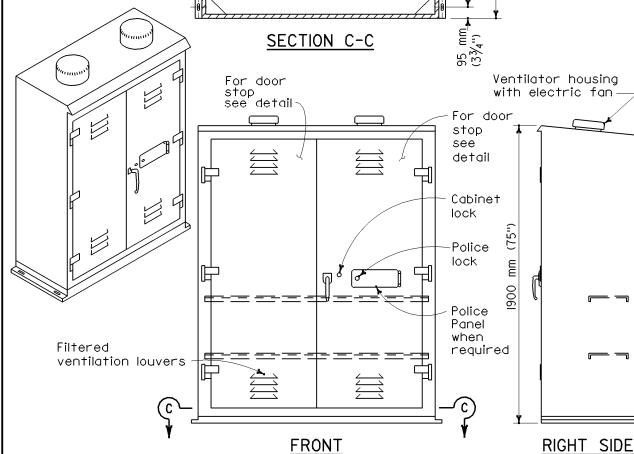
FRONT

RIGHT SIDE

TYPE M CABINET



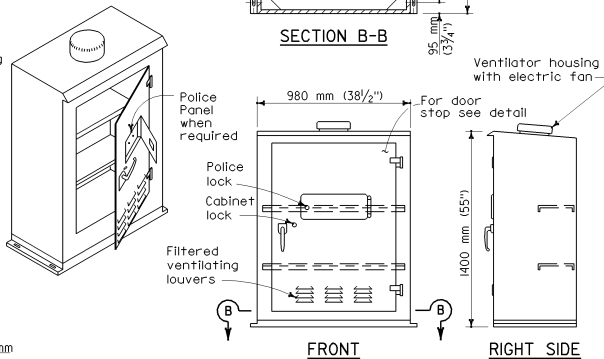
SECTION C-C

BOLT SLOT
DETAIL

FRONT

RIGHT SIDE

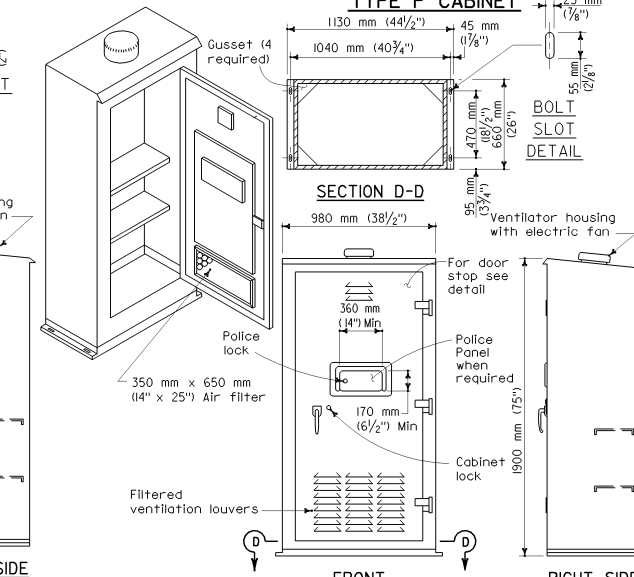
TYPE S CABINET



FRONT

RIGHT SIDE

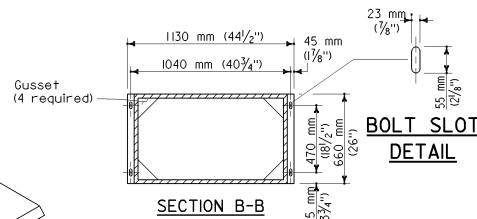
TYPE P CABINET



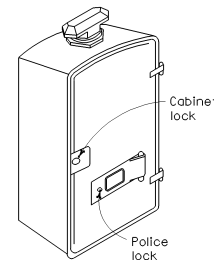
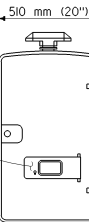
FRONT

RIGHT SIDE

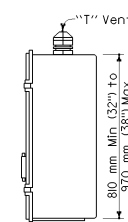
TYPE R CABINET



SECTION B-B

BOLT SLOT
DETAILSee Note 9 on
Standard Plan ES-3CScreened vent.
See Note 10 on
Standard Plan ES-3C.

FRONT

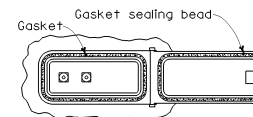


RIGHT SIDE

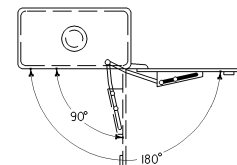


BOTTOM

TYPE G CABINET



POLICE PANEL

PLAN VIEW
DOOR STOP DETAIL
(2 POSITIONS)

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**SIGNAL, LIGHTING AND
ELECTRICAL SYSTEMS
CONTROLLER CABINET
DETAILS**

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NO SCALE

ES-3A

DIST.	COUNTY	ROUTE	KILOMETER TOTAL PROJECT	POST NO.	SHEET NO.	TOTAL SHEETS
<p>Theresa Gabriel REGISTERED PROFESSIONAL ENGINEER</p> <p>July 1, 2002 PLANS APPROVAL DATE</p> <p>The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.</p> <p>Caltrans now has a web site! To get to the web site, go to http://www.dot.ca.gov</p>						

The flash transfer relay shall intermate with a CINCH-JONES Socket S-408-SB or equal connected as follows:

Pin No	Circuit	Pin No	Circuit
1	Coil	5	Common, Circuit #1
2	Coil	6	Common, Circuit #2
3	NC Circuit #1	7	NO Circuit #1
4	NC Circuit #2	8	NO Circuit #2

CONNECTOR SOCKET FLASH TRANSFER RELAY

The flasher shall intermate with a CINCH-JONES Socket S-406-SB or equal connected as follows:

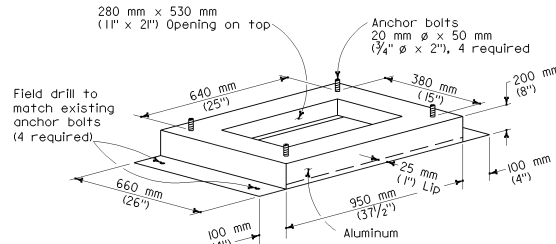
Pin No	Circuit	Pin No	Circuit
7	Load, Ckt #1	10	ac+
8	Load, Ckt #2	11	ac-
9	Chassis Ground	12	Not used

CONNECTOR SOCKET SOLID STATE FLASHER UNIT

The Solid-state switching devices shall intermate with a CINCH-JONES Socket S-2412-SB or equal connected as follows:

Pin No	Circuit	Pin No	Circuit
1	ac+ Lights	7	Green or Walk Output
2	Chassis Ground	8	Yellow Input
3	Red or Don't Walk Output	9	dc+ (15 to 24 V)
4	Not used	10	Green or Walk Input
5	Yellow Output	11	ac-
6	Red or Don't Walk Input	12	Not used

CONNECTOR SOCKET SOLID STATE SWITCHING DEVICE

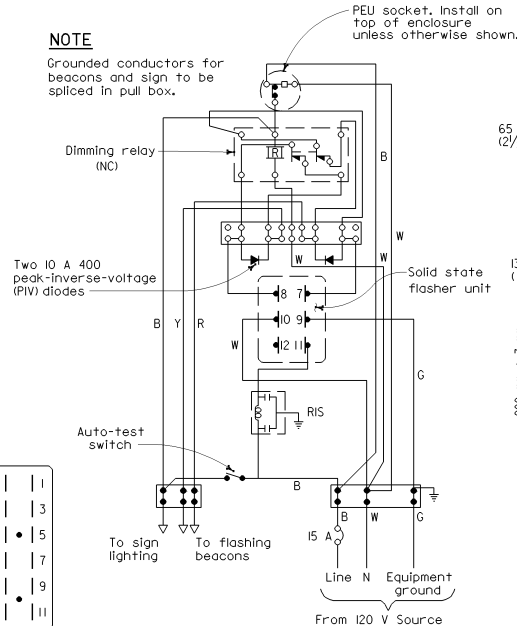


TYPE PR CABINET ADAPTER

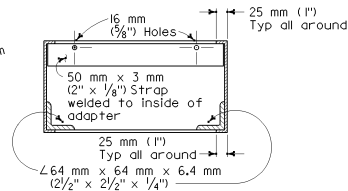
1. Material: 4.78 mm (0.188\") thickness aluminum plate.
2. Mount adapter on Type P or Type R cabinet foundation.

NOTE

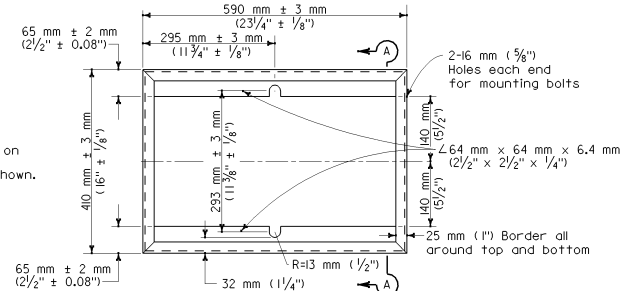
Grounded conductors for beacons and sign to be spliced in pull box.



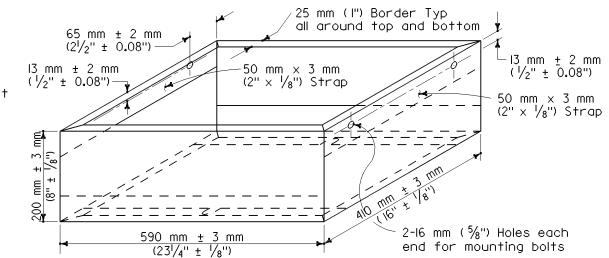
WIRING DIAGRAM FLASHING BEACON CONTROL ASSEMBLY



SECTION A-A



TOP VIEW



TYPE M CABINET ADAPTER

1. Mount adapter on Type M cabinet foundation.
2. Mounting bolts shall be 10 mm (3/8\") ϕ minimum size.
3. Aluminum, 4.78 mm (0.188\") thickness.

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION SIGNAL, LIGHTING AND ELECTRICAL SYSTEMS CONTROLLER CABINET DETAILS

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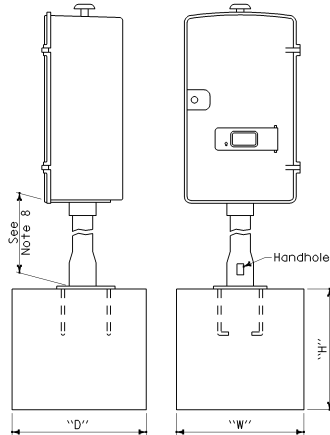
NO SCALE

ES-3B

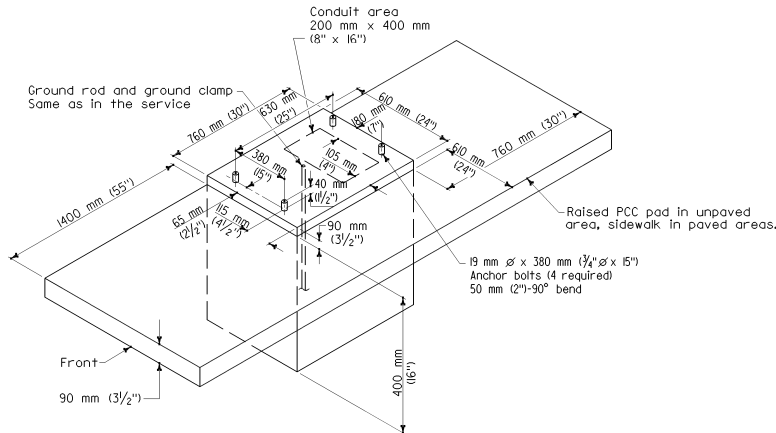
DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
				Theresa Gabriel	
REGISTERED PROFESSIONAL ENGINEER			Theresa A. Gabriel		
July 1, 2002			PLANS APPROVAL DATE		
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NOTES - CONTROLLER CABINETS

- 1. All cabinet dimensions are nominal.
- 2. between face of curb and any portion of cabinet.
Foundations shall be located to provide 600 mm (24") minimum clearance
- 3. Type G, M, 336, P, R and S cabinets shall be installed with the back toward the nearest lane of traffic.
- 4. The controller cabinet grounding bus shall be bonded to conduit or equipment grounding conductor.
- 5. In unpaved areas, a raised Portland cement concrete pad shall be constructed in front of each controller cabinet. Pad shall be 900 mm x 900 mm x 100 mm (36" x 36" x 4") for Type G cabinets and shall be 900 mm x 100 mm (36" x 4") thick x width of foundation for Type M, 336, P, R and S cabinets.
- 6. In unpaved areas, the top of foundation for Type G, P, R and S cabinets shall be 150 mm (6") above surrounding grade. Top of foundation for Type M or 336 cabinet shall be 460 mm (18") above surrounding grade.
- 7. In sidewalks and other paved areas, top of foundation for Type G cabinet shall be level with surrounding grade. Top of foundation for Type P, R and S cabinets shall be 90 mm (3 1/2") above surrounding grade.
- 8. The steel pedestal, base plate, bolt circle and foundation for Type I-C cabinet shall be the same as that shown for a Type I-C Standard. Pedestal shall be 640 mm - 760 mm (25" - 30") in length. Anchor bolts shall be 19 mm (3/4") ϕ x 460 mm (18") with a 50 mm (2") 90° bend. Four bolts required per cabinet.
- 9. Type G cabinet shall be provided with a slipfitter to permit mounting on 114 mm (4 1/2") outside diameter pedestal. Slipfitter shall be bolted to bottom of the cabinet.
- 10. Type G cabinet shall be provided with 8 screened, raintight holes, 13 mm (1/2") diameter or larger, in the bottom of the cabinet.
- 11. A 25 mm (1") drain shall be provided through the foundation of a Type M or 336 cabinet. Drain pipe shall be screened.
- 12. See Table for foundation dimensions: "D"-Depth, "H"-Height, "W"-Width.
- 13. All cabinet shelves shall be adjustable for vertical spacing and shall be removable. Type M, P, R and S cabinets shall be provided with a minimum of two shelves.
- 14. Anchor bolts for Type M, 336, P, R and S cabinets shall be 19 mm ϕ x 460 mm (3/4" ϕ x 18") with a 50 mm (2") - 90° bend. Four bolts required per cabinet.
- 15. An approved mastic or caulking compound shall be placed on the foundation prior to placing the cabinet to seal all openings between bottom of cabinet and foundation.
- 16. Controller units, plug-mounted equipment, shelf-mounted equipment and wall-mounted equipment shall be located to permit its safe and easy removal or replacement without removing any other piece of equipment.
- 17. Cabinet fan may be installed at an alternate location near the top of the cabinet when approved by the Engineer.
- 18. Where telephone interconnect is required, a minimum of 130 mm (5") clear vertical space shall be provided inside the cabinet for the equipment.
- 19. Telephone interconnect conductors shall be enclosed in a 21 (3/4") C or larger conduit through the foundation. Type 4 metal conduit shall be used to separate telephone and power conductors in cabinets and pedestals.
- 20. For 332, 334 and 336 cabinet details, see "Traffic signal controller equipment specifications".

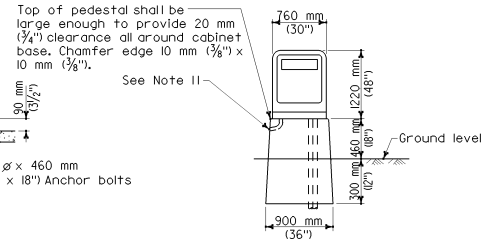


PCC FOUNDATION FOR TYPE G CABINET



FOUNDATION DETAILS
For Model 332 and 334 cabinets
(Type I housing)

PCC FOUNDATION FOR TYPE P, R AND S CABINETS



PCC PEDESTAL FOUNDATION FOR TYPE M OR MODEL 336 (TYPE 2 HOUSING) CABINET

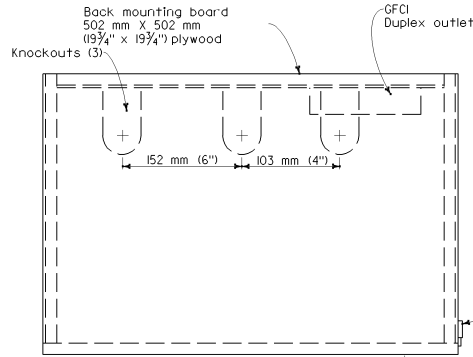
CABINET	FOUNDATION			
	TYPE	H	W	D
G	900 mm (36")	600 mm (24")	600 mm (24")	
M 336	760 mm (30")	900 mm (36")	560 mm (22")	
P	460 mm (18")	1270 mm (50")	760 mm (30")	
R	460 mm (18")	1270 mm (50")	760 mm (30")	
S	460 mm (18")	1270 mm (50")	760 mm (30")	

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
SIGNAL, LIGHTING AND ELECTRICAL SYSTEMS CONTROLLER CABINET DETAILS

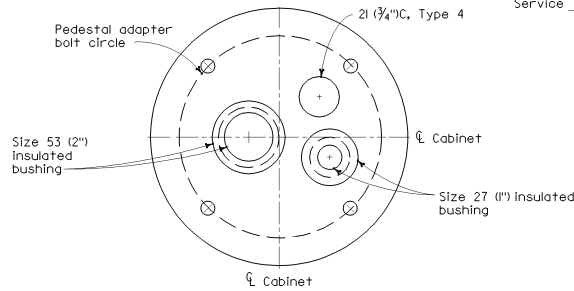
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NO SCALE

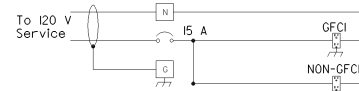
ES-3C



TOP



SECTION A-A

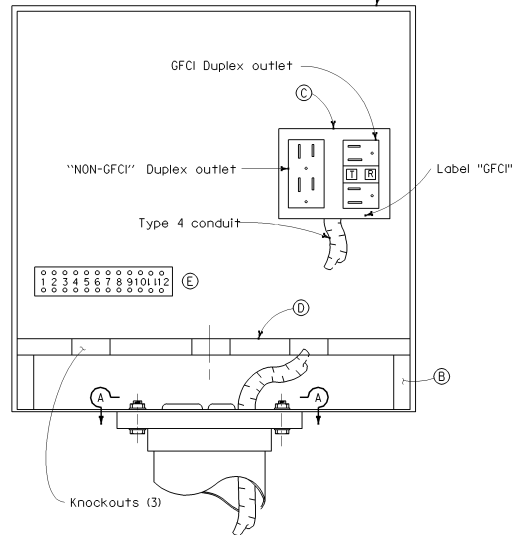


WIRING DIAGRAM

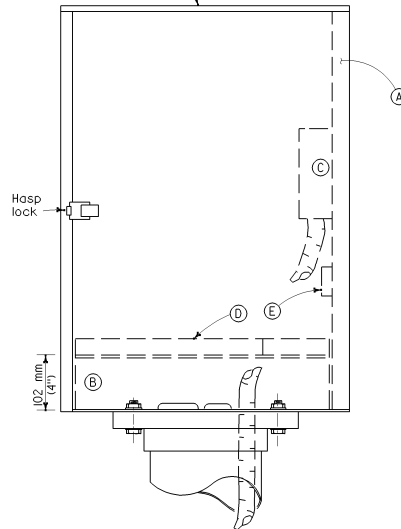
TERMINATION CABINET NOTES

1. Mount cabinet on Type G cabinet pedestal. See ES-3C.
2. Use Type G cabinet PCC Foundation
3. Plywood shall be 13 mm (1/2") thick and grade ACX.

NEMA 3R Enclosure 508 mm X 508 mm X 305 mm
(20" x 20" x 12") (W x H x D)
hinged cover with padlock hasp,
2 mm (0.080") minimum thickness



FRONT



RIGHT SIDE

FASTENER SCHEDULE

- | | |
|--------------------------------------|---------------------------------------|
| (A) Back mounting board | 4 - 19 mm (3/4") (length) wood screws |
| (B) Shelf supports (2) | 4 - 19 mm (3/4") (length) wood screws |
| (C) Duplex outlet boxes to backboard | 4 - 13 mm (1/2") (length) wood screws |
| (D) Bottom shelf | |
| (E) I2 Positions terminal block | 4 - 19 mm (3/4") (length) wood screws |

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION SIGNAL LIGHTING AND ELECTRICAL SYSTEMS TELEPHONE DEMARCATION CABINET DETAILS TYPE A

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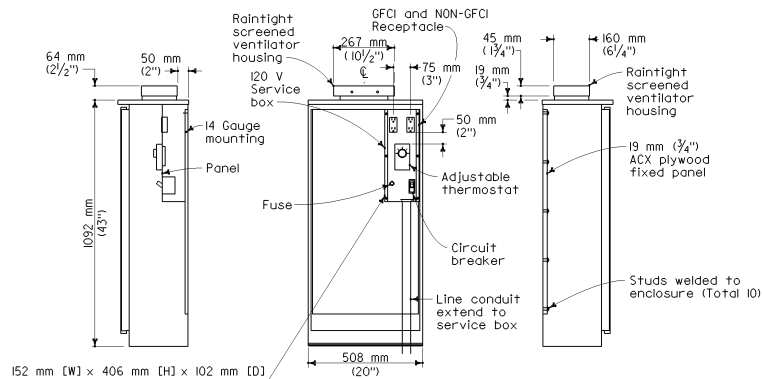
NO SCALE

ES-3D

DIST	COUNTY	ROUTE	KILOMETER TOTAL PROJECT	POST NO.	SHEET NO.	TOTAL SHEETS
<p><i>Theresa A. Gabriel</i> REGISTERED PROFESSIONAL ENGINEER No. E15123 Exp. 6-30-04 STATE OF CALIFORNIA</p> <p>July 1, 2002 PLANS APPROVAL DATE</p> <p>The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.</p> <p>Caltrans now has a web site! To get to the web site, go to: http://www.dot.ca.gov</p>						

NOTES:

1. Telephone demarcation cabinet shall be furnished with mounting boards, outlet box and outlet plate. All dimensions are nominal.
2. Telephone demarcation cabinet shall be installed with the back toward the nearest lane of traffic.
3. The telephone demarcation cabinet grounding bus shall be bonded to conduit or equipment grounding conductor.
4. All conduits, anchor bolts and enclosure cabinet shall be bonded to ground.
5. Telephone demarcation cabinet:
 - a) Dimensions are 508 mm x 508 mm x 305 mm (20" x 20" x 12") (W x H x D).
 - b) Material shall be anodized aluminum 2 mm (0.080") minimum thickness.
 - c) Fabrication shall conform to the requirements in Section 86-3.04A, "Cabinet Construction" of the Standard Specifications.
 - d) Door shall be lockable with padlock.
6. In unpaved areas, the top of foundation for the telephone demarcation cabinet shall be 150 mm (6") above surrounding grade.
7. In sidewalks and other paved areas, top of foundation for the telephone demarcation cabinet shall be level with surrounding grade.
8. The steel pedestal, base plate, bolt circle and foundation for the telephone demarcation cabinet shall be the same as that shown for a Type I-C Standard. Pedestal shall be 640 mm-760 mm (25" x 30") in length. Anchor bolts required shall be 19 mm (3/4") x 460 mm (18") with a 50 mm (2")-90° bend. Four bolts required per cabinet.
9. Telephone demarcation cabinet shall be provided with a slip fitter to permit mounting on 114 mm (4 1/2") outside diameter pedestal. Slip fitter shall be bolted to bottom of cabinet.
10. Telephone interconnect conductors shall be enclosed in a 21 (3/4")C or larger conduit through the foundation. Type 4 metal conduit shall be used to separate telephone and power conductors in cabinets and pedestals.

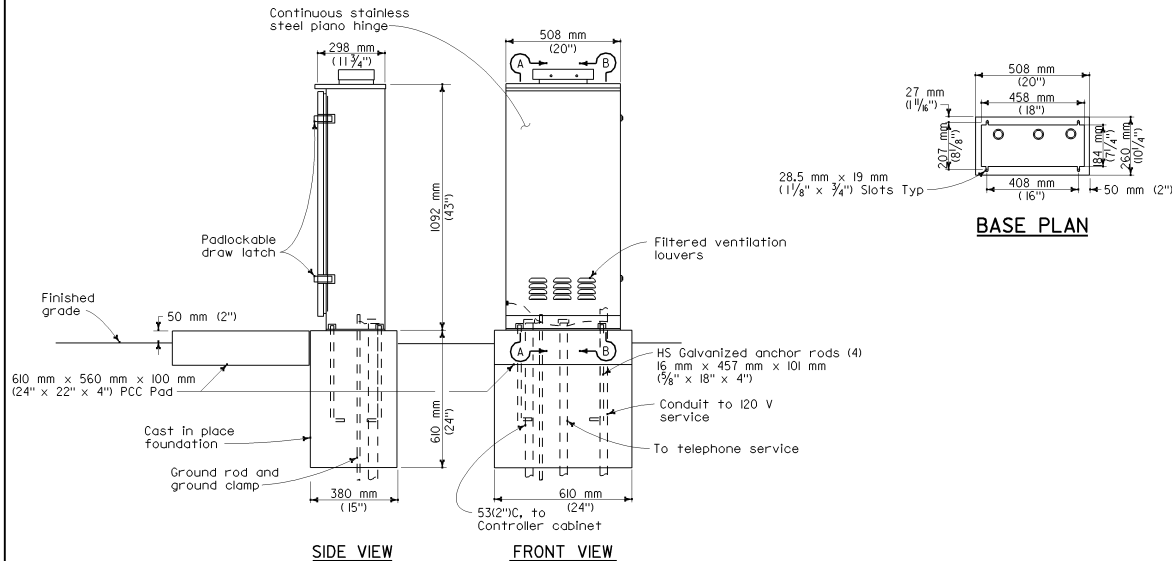


SECTION B-B

FRONT VIEW

SECTION A-A

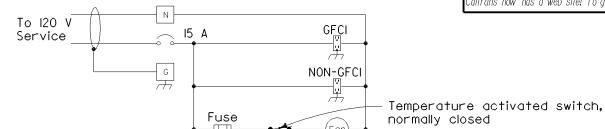
(Outer door removed for clarity)



SIDE VIEW

FRONT VIEW

BASE PLAN



WIRING DIAGRAM

NOTES

- The telephone demarcation cabinet shall be furnished with a mounting panel, outlets, breaker and deadfront plates in place. All dimensions are nominal.
- An approved mastic or caulking compound shall be placed on the foundation, prior to placing the pedestal, to seal all openings between the bottom of the pedestal and the foundation.
- In unpaved areas, a raised PCC pad shall be placed in front of the telephone demarcation cabinet. Pad shall be 610 mm x 560 mm x 100 mm (24" x 22" x 4") thick, with 50 mm (2") above the finished grade.
- All conduits, anchor bolts and enclosure cabinet shall be grounded and bonded to the ground rod.
- Telephone demarcation cabinet:
 - Material shall be anodized aluminum, 3.2 mm (1/8") thick.
 - Fabrication shall conform to the requirements of Section 86-304A, "Cabinet Construction", of the Standard Specifications.
 - The exterior door shall be side hung and secured with a padlockable draw latch, the padlock hole shall be a minimum diameter of 11 mm (1/2") to receive a State-furnished padlock.
 - Ventilating louvers shall be located on the door.
 - Fan shall be mounted in ventilator housing.
 - Fan shall be thermostatically controlled and manually adjustable to turn on between 32°C and 65°C (90°F and 149°F).
 - Fan circuit shall be fused at 175 percent of the fan motor capacity.
 - Fan capacity shall be at least 0.7 m³ (25 cubic feet) per minute.
 - Fasten fixed mounting panels with nuts, lock and flat washers to 5 mm (3/16") ø x 25 mm (1") studs welded to enclosure.

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**SIGNAL, LIGHTING AND
ELECTRICAL SYSTEMS
TELEPHONE DEMARCATION
CABINET DETAILS
TYPE B**

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NO SCALE

ES-3E

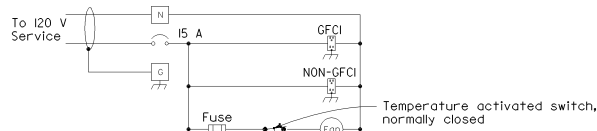
DIST.	COUNTY	ROUTE	KILOMETER TOTAL PROJECT	POST NO.	SHEET TOTAL SHEETS

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REGISTERED PROFESSIONAL ENGINEER
No. 515129
Exp. 6-30-04
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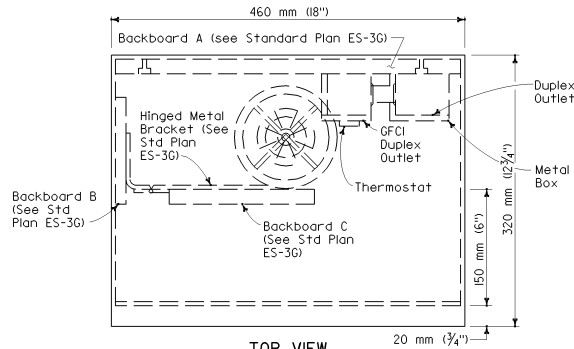
July 1, 2002
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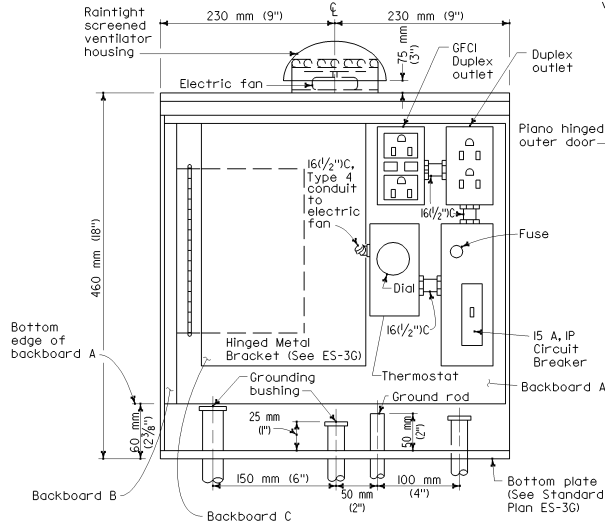
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WIRING DIAGRAM

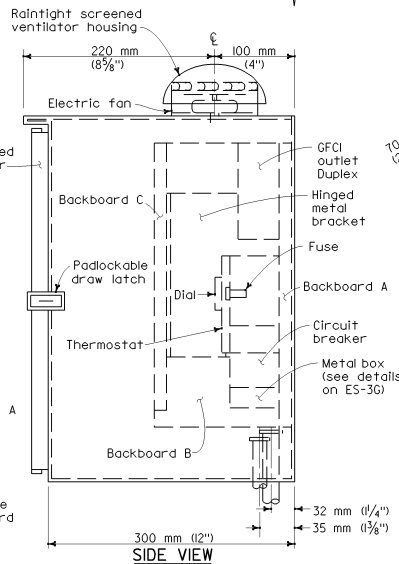


TOP VIEW

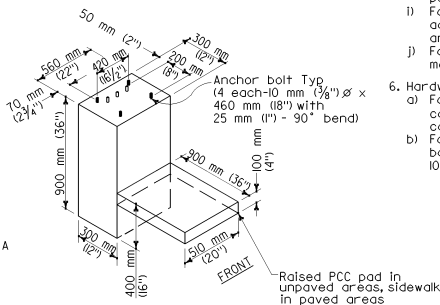
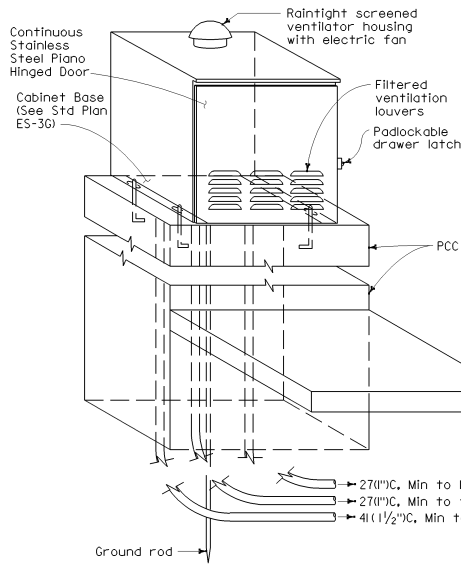


FRONT VIEW

(Outer door removed)



SIDE VIEW



FOUNDATION DETAILS

NOTES:

1. Telephone demarcation cabinet shall be furnished with mounting boards, thermostat, fan, outlet box and outlet plate. All dimensions are nominal.
2. An approved mastic or caulking compound shall be placed on the foundation prior to placing the cabinet to seal all openings between bottom of cabinet and foundation.
3. In unpaved areas, a raised PCC pad shall be placed in front of the demarcation cabinet. Pad shall be 900 mm x 500 mm x 100 mm (36" x 20" x 4") thick.
4. All conduits, anchor bolts and enclosure cabinet shall be bonded to the ground rod.
5. Telephone demarcation cabinet:
 - a) Dimensions shall be 460 mm (18") x 460 mm (18") x 300 mm (12") (WxDxH).
 - b) Material shall be anodized aluminum (3.2 mm (1/8") thick).
 - c) Fabrication: Shall conform to the requirements in Section 86-3.04A, "Cabinet Construction" of the Standard Specifications.
 - d) Ventilation louvers shall be located in door.
 - e) Door shall be lockable with padlock.
 - f) Fan shall be mounted in ventilator housing.
 - g) Fan capacity shall be at least 0.7 m³ (25 cubic feet) per minute.
 - h) Fan shall be thermostatically controlled and manually adjustable to turn on between 32°C (90°F) and 65°C (149°F).
 - i) Fan circuit shall be fused at 175 percent of the fan motor capacity.
6. Hardware for fastening of mounting boards:
 - a) Fasten backboard A and backboard B to demarcation cabinet with 5 mm (3/16") x 20 mm (3/4") stainless steel carriage bolts (8 required).
 - b) Fasten hinged metal bracket to backboard B and backboard C to hinged metal bracket with number 10 mm x 20 mm (No. 10 x 3/4") wood screws (9 required).

STATE OF CALIFORNIA
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**SIGNAL LIGHTING AND
ELECTRICAL SYSTEMS
TELEPHONE DEMARCATION
CABINET DETAILS
TYPE C**

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NO SCALE

ES-3F

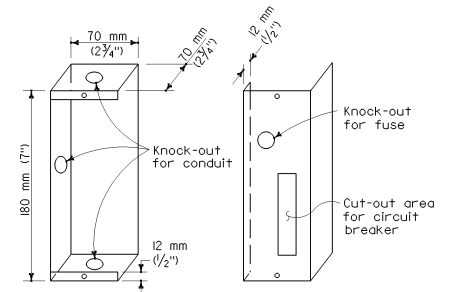
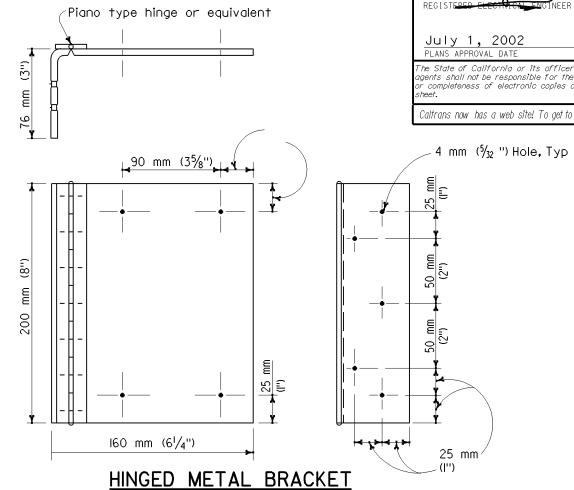
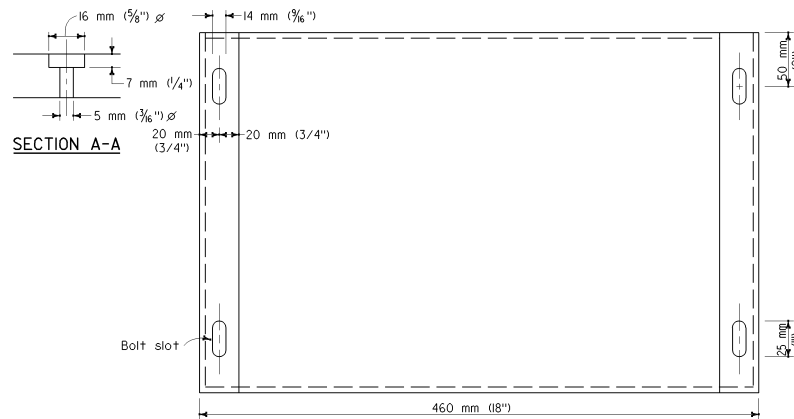
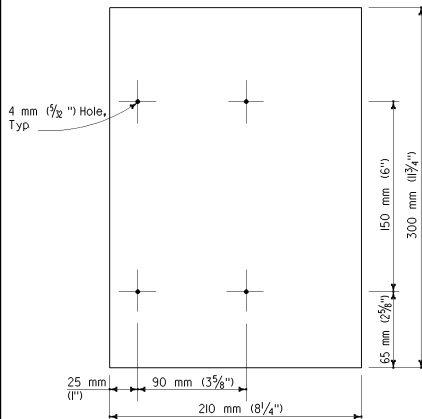
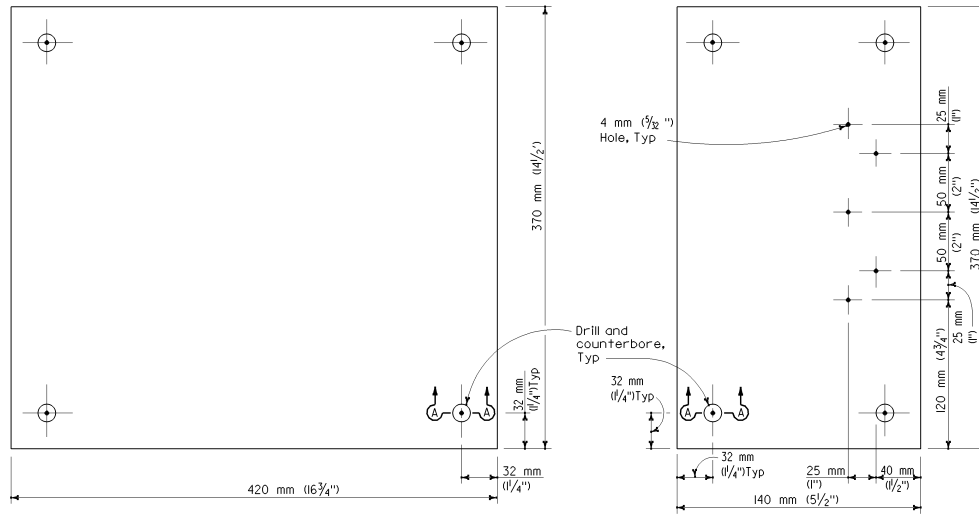
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**SIGNAL LIGHTING AND
ELECTRICAL SYSTEMS
TELEPHONE DEMARCATION
CABINET DETAILS
TYPE C**

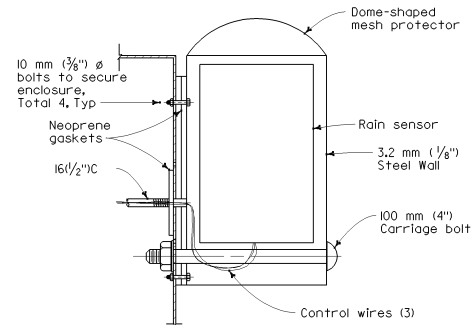
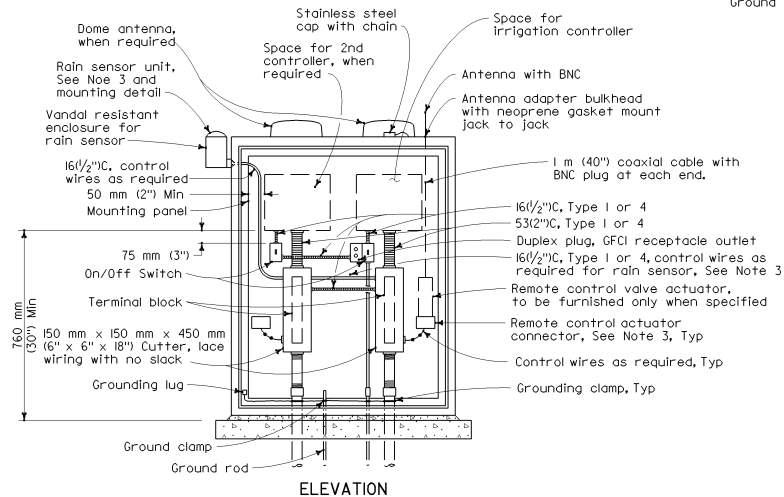
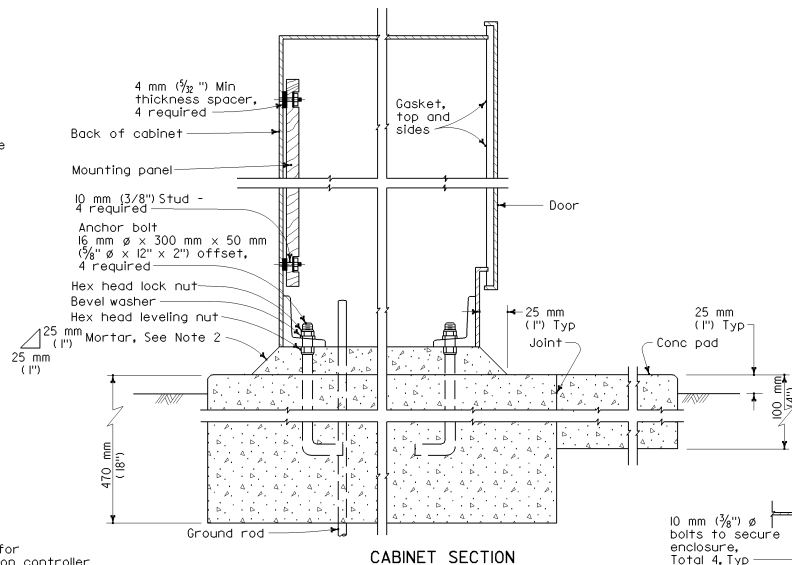
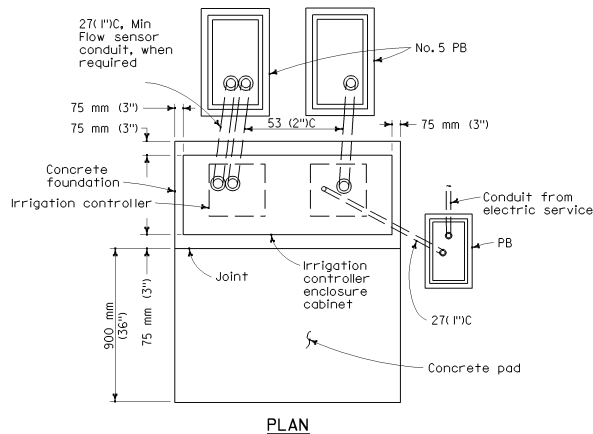
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NO SCALE

ES-3G

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**SIGNAL, LIGHTING AND
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IRRIGATION CONTROLLER
ENCLOSURE CABINET**

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NO SCALE

ES-3H

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<p><i>Theresa Gabriel</i> REGISTERED PROFESSIONAL ENGINEER No. 515123 Exp. 6-30-04 STATE OF CALIFORNIA</p> <p>July 1, 2002 PLANS APPROVAL DATE</p> <p><small>The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.</small></p> <p><small>Caltrans now has a web site! To get to the web site, go to http://www.dot.ca.gov</small></p>					

NOTES:

- All dimensions are nominal.
- Mortar shall be 1-part cement, 2-parts plaster sand.
- Rain sensor unit and/or remote control valve actuator connectors. To be provided only when specified.
- See project plans for location and number of irrigation controllers for each cabinet.
- Switch and GFCI outlet boxes shall be cast metal with threaded hubs and cast metal covers with gaskets. Snap switches shall be 20 A, 120/277 V specifications grade switch.

Plan view of other
side mountings



SV-2-TC



SV-2-TD



SV-3-TC



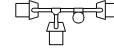
SV-4-TC



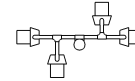
SV-2-B



SV-2-TB



SV-3-TB



SV-4-TB



SV-1



SV



SV-1-T



SV-2A



SV-2-TA



SV-3-TA



SV-4-TA

SIDE MOUNTINGS



TV-1



TV-1-T



TV-2



TV-2-T



TV-3-T



TV-4-T

TOP MOUNTINGS

VEHICULAR SIGNALS AND MOUNTINGS

ABBREVIATIONS

TV - Top mounted vehicle signals

SV - Side mounted vehicle signals

T - Terminal compartment

1, 2, 3, 4 - Number of signal faces
(3 - section, unless otherwise indicated)

NOTES

- Mountings shall be oriented to provide maximum horizontal clearance to adjacent roadway.
- Bracket arms shall be long enough to permit proper alignment of signals and backplate installation.
- See Standard Plans ES-4D and ES-4E for attachment fitting details.
- All arrow indications shall be 300 mm (12").
- All programmed visibility signal heads shall be provided with backplates.

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION SIGNAL, LIGHTING AND ELECTRICAL SYSTEMS SIGNAL HEADS AND MOUNTINGS

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NO SCALE

ES-4A

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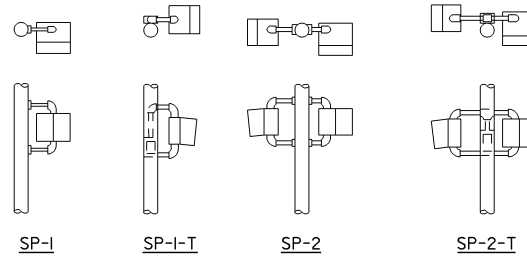
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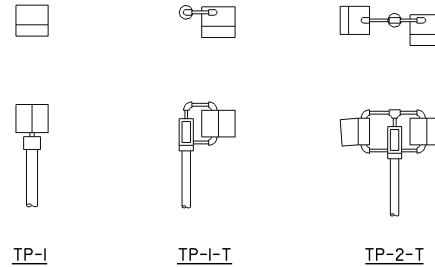
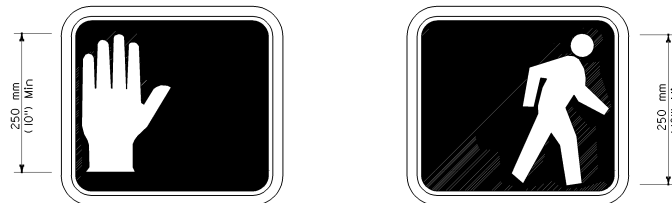
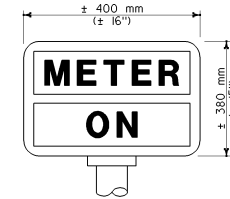
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SIDE MOUNTINGS

TOP MOUNTINGS
PEDESTRIAN SIGNALS AND MOUNTINGSPEDESTRIAN SIGNAL FACE
SYMBOL TYPEINTERNALLY ILLUMINATED SIGN
METER ON TYPE

NOTES

1. Mounting shall be oriented to provide maximum horizontal clearance to adjacent roadway.
2. Pedestrian signals shall be positioned on the side of standard nearest crosswalk controlled.
3. Bracket arms shall be long enough to permit proper alignment of signals.
4. See Standard Plan ES-4D for attachment fitting details.

ABBREVIATIONS

- TP - Top mounted pedestrian signal
SP - Side mounted pedestrian signal
T - Terminal compartment
1, 2 - Number of signal faces

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**SIGNAL, LIGHTING AND
ELECTRICAL SYSTEMS
SIGNAL HEADS AND MOUNTINGS**

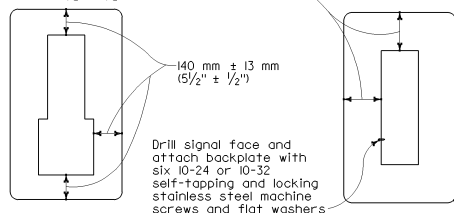
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NO SCALE

ES-4B

(Right angle is reversed of figure)

200 mm \pm 13 mm (8" \pm 1/2") for 200 mm (8") sections
140 mm \pm 13 mm (5 1/2" \pm 1/2") for 300 mm (12") sections

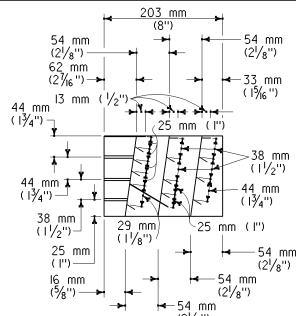


FOR COMBINATION 200 mm (8")
AND 300 mm (12") SECTIONS

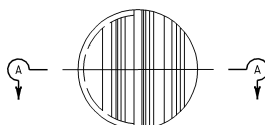
200 mm (8") AND (2)
300 mm (12") SECTIONS

BACKPLATE

1.5 mm (1/16") minimum thickness
3001-14 aluminum, or plastic
when specified



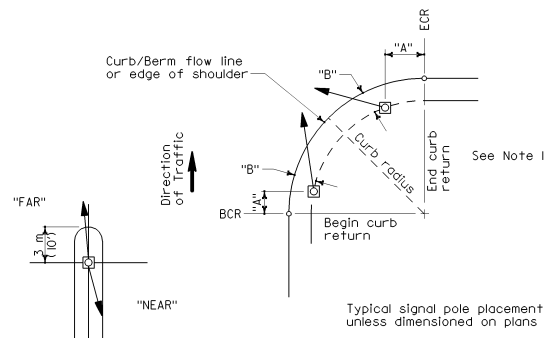
SECTION A-A



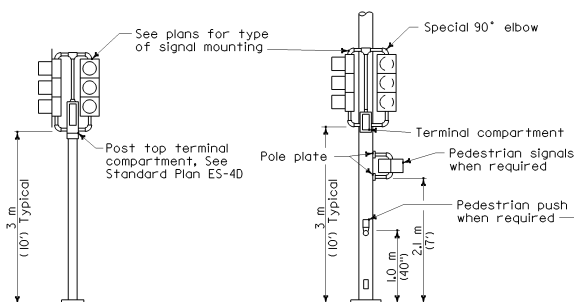
FRONT VIEW

DIRECTIONAL LOUVER

Directional louvers shall be oriented as directed by the Engineer and secured in place with one plated brass machine screw and nut.

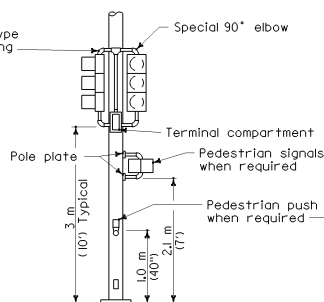


SIGNAL STANDARD PLACEMENT DIMENSIONS AND EQUIPMENT LOCATIONS



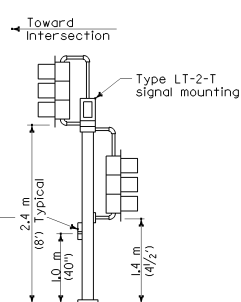
TOP MOUNTED
SIGNALS (TV)

Type I-A, I-B, I-C and I-D standard
as indicated on the plans



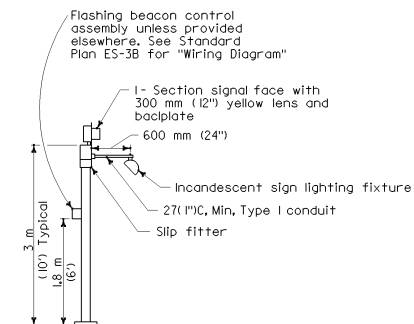
SIDE MOUNTED SIGNALS (SV AND SP)

Normally used on standards
with luminaire and/or signal
mast arm



LEFT TURN
LANE SIGNAL

Type I-A, I-B, I-C and I-D standard
as indicated on plans



ADVANCE FLASHING BEACON INSTALLATION

Type I-A, I-B, I-C and I-D standard
as indicated on plans

NOTE:

1. For "A" and "B" dimensions, see Pole Schedule, or as directed by the Engineer.

ABBREVIATIONS

LT = Left turn signals

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DEPARTMENT OF TRANSPORTATION

**SIGNAL, LIGHTING AND
ELECTRICAL SYSTEMS
SIGNAL HEADS AND MOUNTINGS**

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NO SCALE

ES-4C

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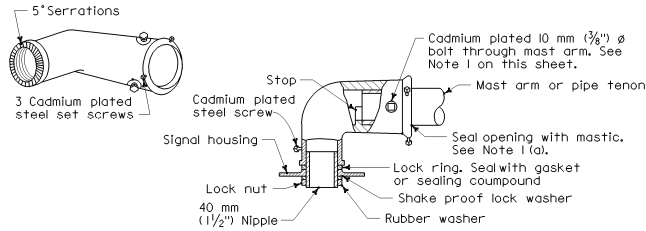
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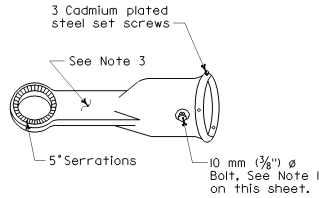
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MAST ARM MOUNTING - TYPE "MAT"

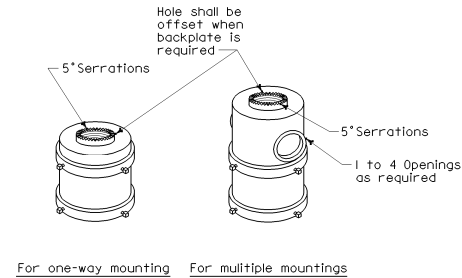
For 2 NPS pipe, See Note 1 on this sheet.



MAST ARM MOUNTING - TYPE "MAS"

For 2 NPS pipe, See Note 1 on this sheet.

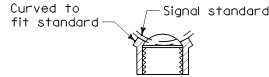
SIGNAL SLIP FITTERS



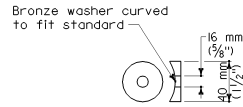
For one-way mounting For multiple mountings

TOP MOUNTINGS

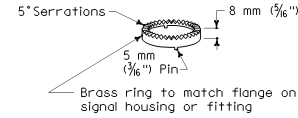
For 4 NPS pipe, See Note 2 on this sheet.



SECTION A-A

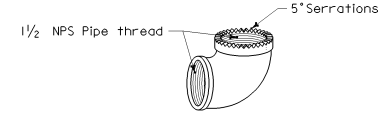


WASHER DETAIL "C"



LOCK RING

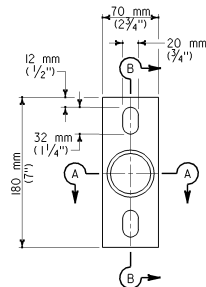
Use where locking ring is not integral with signal housing or fitting



SPECIAL 90° ELBOW

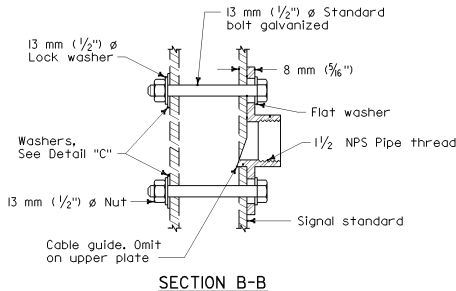
One for each face, except those with special slip fitter mounting

MISCELLANEOUS MOUNTING HARDWARE

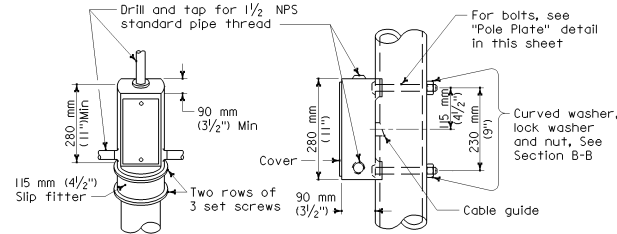


POLE PLATE

For side mountings



SECTION B-B



TOP MOUNTING

SIDE MOUNTING

TERMINAL COMPARTMENTS

NOTES

- After mast arm signal has been plumbed and secured, drill 11 mm (7/16") hole through mast arm tenon in line with slip fitter hole. Place a 10 mm (3/8") Ø galvanized bolt with washer under bolt head through hole and secure with washer, nut, and locknut.
- (a) Seal openings between MAS, MAT or MAS-5 mountings and mast arm.
(b) Threaded top mounted slip fitter openings shall be 1/2 NPS.
(c) Top opening shall be offset when backplate is used.
- Wireway shall have a cross section area of 600 mm² (0.93 square inch) minimum. Minimum width of 13 mm (1/2").

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SIGNAL, LIGHTING AND ELECTRICAL SYSTEMS SIGNAL HEADS AND MOUNTINGS

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NO SCALE

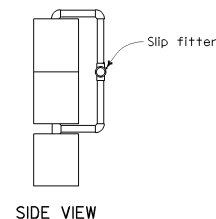
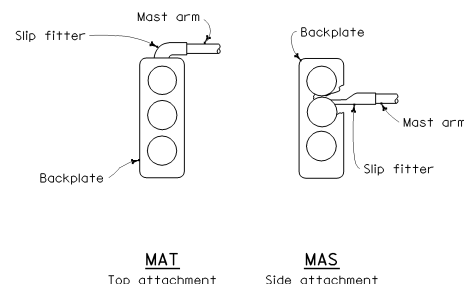
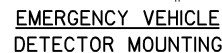
ES-4D

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ES-4E

ABBREVIATIONS

- | | |
|--------|---|
| MAT | Most arm mounted vehicle signals,
top attachment. |
| MAS | Most arm mounted vehicle signals,
side attachment. |
| MAS-4A | Most arm mounted vehicle signals, |
| MAS-4B | side attachment - 4 signal sections. |
| MAS-4C | |
| MAS-5A | Most arm mounted vehicle signals, |
| MAS-5B | side attachment - 5 signal sections. |



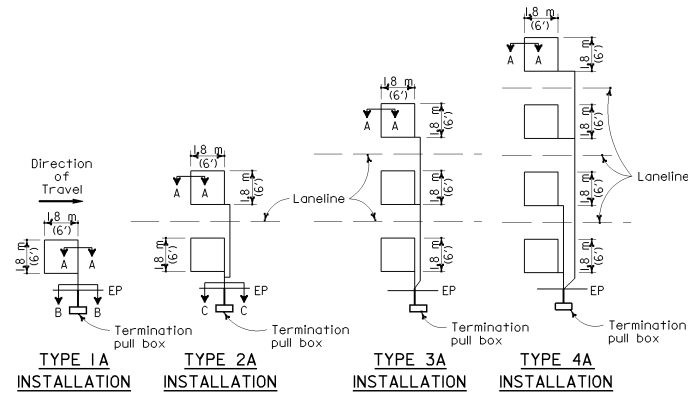
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**SIGNAL, LIGHTING AND
ELECTRICAL SYSTEMS
SIGNAL HEADS AND MOUNTINGS**

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NO SCALE

LOOP INSTALLATION PROCEDURE

1. Install termination pull box with curb or shoulder termination detail, See Standard Plan ES-5E.
2. Loops shall be centered in lanes.
3. Saw slots in pavement for loop conductors as shown in details.
4. Distance between side of loop and a lead-in saw cut from adjacent detectors shall be 600 mm (24") minimum. Distance between lead-in saw cuts shall be 150 mm (6") minimum.
5. Bottom of saw slot shall be smooth with no sharp edges.
6. Slots shall be washed until clean, blown out and thoroughly dried before installing loop conductors.
7. Adjacent loops on the same sensor unit channel shall be wound in opposite direction.
8. Identify and tag loop circuit pairs in the termination pull box. Identify and tag with loop number, start (S) and finish (F) of conductor. Identify and tag lead-in-cable with sensor number and phase.
9. Install loop conductor in slot using a 5 mm ($\frac{3}{16}$ " to $\frac{1}{4}$ ") thick wood paddle. Hold loop conductors with wood paddles (at the bottom of the sawed slot) during sealant placement.
10. No more than 2 twisted pairs shall be installed in one sawed slot.
11. Allow additional length of conductor for the run to termination pull box plus 1.5 m (5') of slack in pull box.
12. The additional length of each conductor for each loop shall be twisted together into a pair, 6 turns per meter (40") minimum before being placed in the slot and conduit leading to termination pull box.
13. Test each loop circuit for continuity, circuit resistance and insulation resistance at the pull box before filling slots.
14. Fill slots as shown in details.
15. Splice loop conductors to lead-in-cable. All splices shall be soldered using rosin-core solder.
16. End of lead-in-cable and Type 2 loop wire shall be waterproof prior to installing in conduit to prevent moisture from entering the cable.
17. Lead-in-cable shall not be spliced between the termination pull box and the controller cabinet terminals.
18. Test each loop circuit for continuity, circuit resistance and insulation resistance at the controller cabinet location.
19. Where loop conductors are not to be spliced to a lead-in-cable, the ends of the conductors shall be taped and waterproofed with electrical insulating coating.

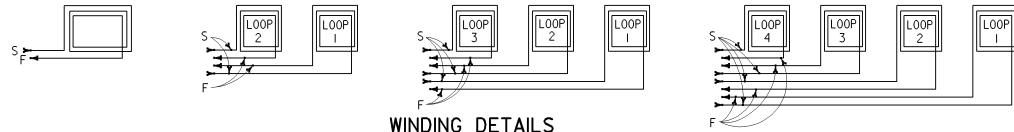


SAWCUT DETAILS

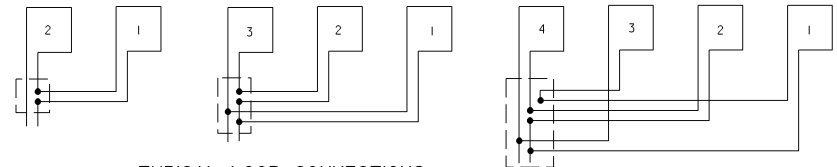
Type A loop detector configurations illustrated

1. 1A thru 4A = 1 Type A loop configuration in each lane.
2. 1B thru 4B = 1 Type B loop configuration in each lane.
3. 1C = 1 Type C loop configuration entering lanes as required.
4. 1D thru 4D = 1 Type D loop configuration in each lane.
5. 1E thru 4E = 1 Type E loop configuration in each lane.
6. 1G thru 4G = 1 Type G loop configuration in each lane.
7. 1H thru 4H = 1 Type H loop configuration in each lane.
8. 1I thru 4I = 1 Type I loop configuration in each lane.
9. 1J thru 4J = 1 Type J loop configuration in each lane.
10. 1K thru 4K = 1 Type K loop configuration in each lane.
11. 1L thru 4L = 1 Type L loop configuration in each lane.
12. 1M thru 4M = 1 Type M loop configuration in each lane.
13. 1N thru 4N = 1 Type N loop configuration in each lane.
14. 1O thru 4O = 1 Type O loop configuration in each lane.
15. 1P thru 4P = 1 Type P loop configuration in each lane.
16. 1Q thru 4Q = 1 Type Q loop configuration in each lane.
17. 1R thru 4R = 1 Type R loop configuration in each lane.
18. 1S thru 4S = 1 Type S loop configuration in each lane.
19. 1T thru 4T = 1 Type T loop configuration in each lane.
20. 1U thru 4U = 1 Type U loop configuration in each lane.
21. 1V thru 4V = 1 Type V loop configuration in each lane.
22. 1W thru 4W = 1 Type W loop configuration in each lane.
23. 1X thru 4X = 1 Type X loop configuration in each lane.
24. 1Y thru 4Y = 1 Type Y loop configuration in each lane.
25. 1Z thru 4Z = 1 Type Z loop configuration in each lane.

(Use Type A, B, C, D, E or O loop detector configurations only when specified or shown on plans.)



WINDING DETAILS



TYPICAL LOOP CONNECTIONS

(Dashed lines represent the pull box)
Number 1 loop is the closest to the crosswalk

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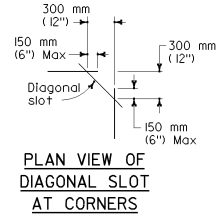
SIGNAL, LIGHTING AND ELECTRICAL SYSTEMS DETECTORS

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NO SCALE

ES-5A

DIST.	COUNTY	ROUTE	KILOMETER TOTAL PROJECT	POST NO.	SHEET TOTAL SHEETS
<p>Theresa Gabriel REGISTERED PROFESSIONAL ENGINEER No. E15129 Exp. 6-30-04 STATE OF CALIFORNIA</p> <p>July 1, 2002 PLANS APPROVAL DATE</p> <p>The State of California or its officers or agents shall not be responsible for the accuracy or completeness or electronic copies of this plan sheet.</p> <p>Caltrans now has a web site! To get to the web site, go to https://www.dot.ca.gov</p>					



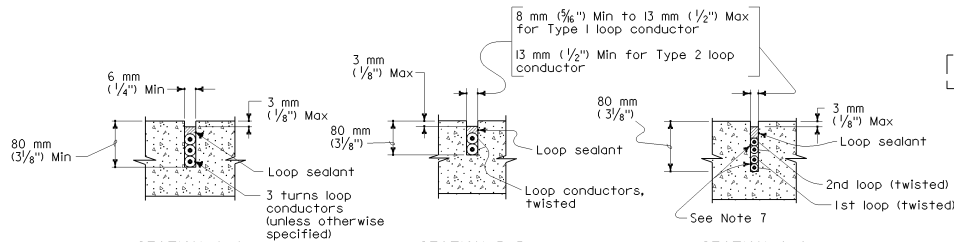
PLAN VIEW OF DIAGONAL SLOT AT CORNERS

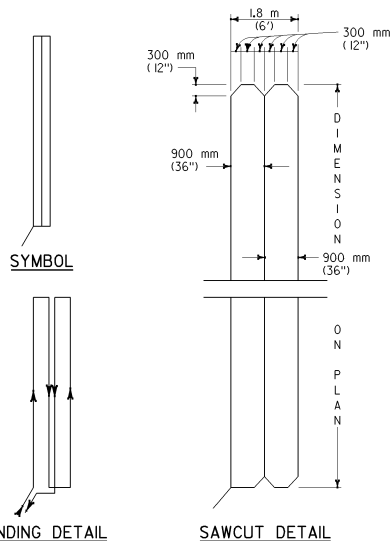
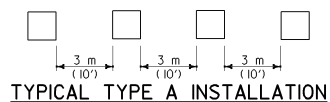
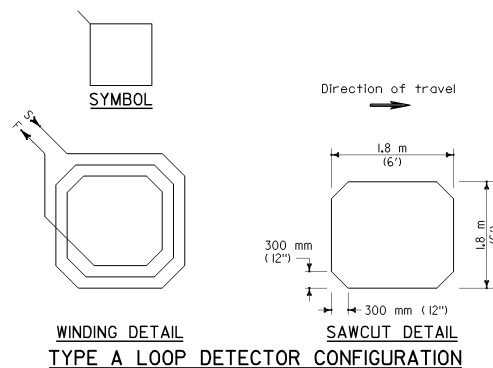
SECTION A-A

SECTION B-B

SECTION C-C

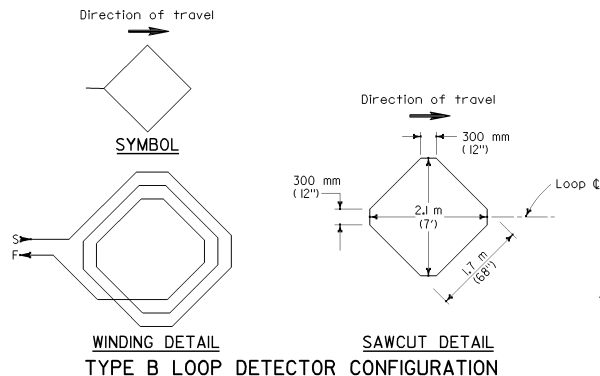
SLOT DETAILS - TYPE 1 AND TYPE 2 LOOP CONDUCTOR



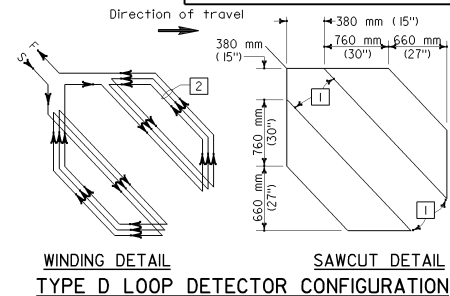
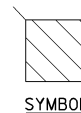
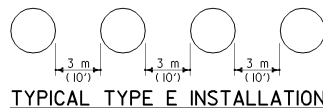
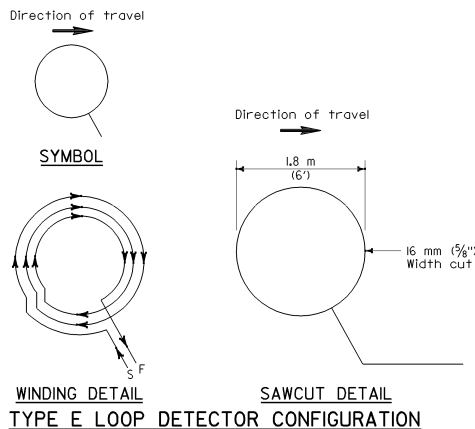
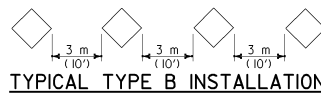


TYPICAL TYPE C INSTALLATION

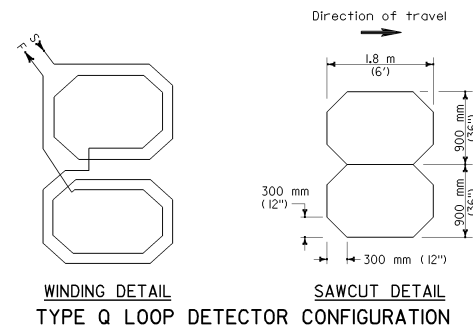
*Install two turns unless otherwise specified.



NOTE
Install loop with loop centerline parallel to curb or lane line.



- 1 Round corners of acute angle sawcuts to prevent damage to conductors.
- 2 Install 3 turns when only one Type D loop is on a sensor unit channel. Install 5 turns when one Type D loop is connected in series with 3 additional 1.8 m x 1.8 m (6' x 6') loops on a sensor unit channel.



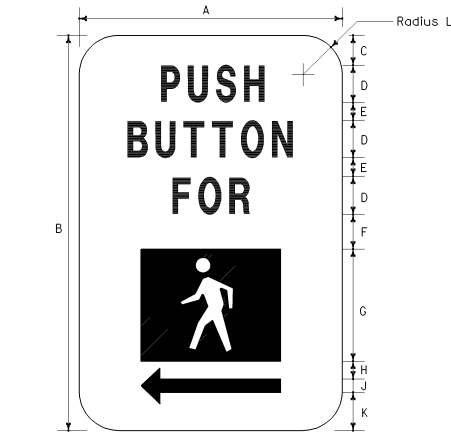
STATE OF CALIFORNIA
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SIGNAL, LIGHTING AND ELECTRICAL SYSTEMS DETECTORS

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NO SCALE

ES-5B

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
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REGISTERED PROFESSIONAL ENGINEER Theresa A. Gabriel No. E15129 EXPIRATION DATE 6-30-04 STATE OF CALIFORNIA					



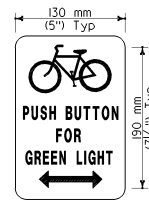
ALTERNATIVE SYMBOL AND ARROW DIRECTIONS:
LEFT, RIGHT OR BOTH



LEFT

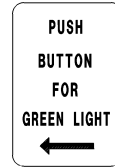


RIGHT

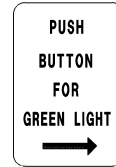


BOTH

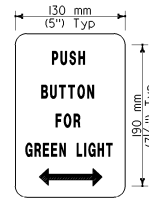
FOR BICYCLE LANES
(Use only when specified)
Black legend on white background.



LEFT



RIGHT



BOTH

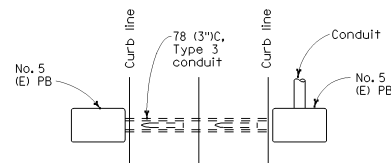
FOR 3-LIGHT SIGNALS
(Use only when specified)
Black legend on white background.

SIGN DIMENSIONS (mm)											
	A	B	C	D	E	F	G	H	J	K	L
Min	130 mm (5")	190 mm (7 1/2")	15 mm (3/8")	20 mm (3/4")	10 mm (3/8")	12 mm (1/2")	50 mm (2")	10 mm (3/8")	6 mm (1/4")	17 mm (9/16")	20 mm (3/4")

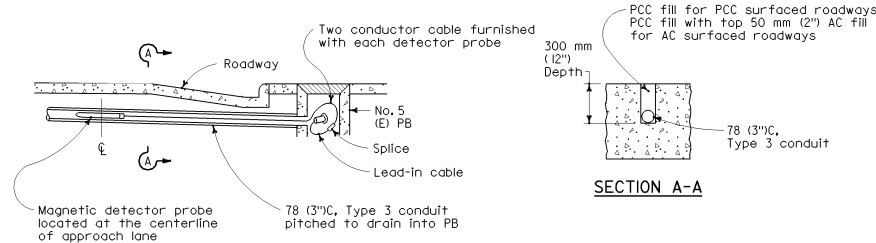
NOTE

Color of legend and arrow are black.
Color of background and symbol are white.

PEDESTRIAN PUSH BUTTON SIGNS

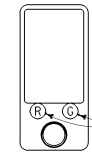


PLAN

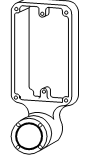


ELEVATION

**MAGNETIC VEHICLE DETECTOR
INSTALLATION DETAILS**



TYPE A
(Use only when specified)



TYPE B



TYPE C
(Use only when specified)

PEDESTRIAN PUSH BUTTONS

NOTE

1. Back casting shape to fit curvature of post.
2. Provide cover fitting for top of post, when PPB is mounted on pedestrian push button post.
3. Install push button on crosswalk side of standard.
4. Actuator shall be 50 mm (2"), minimum in diameter.

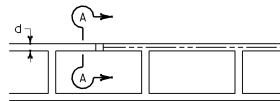
STATE OF CALIFORNIA
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**SIGNAL, LIGHTING AND
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DETECTORS**

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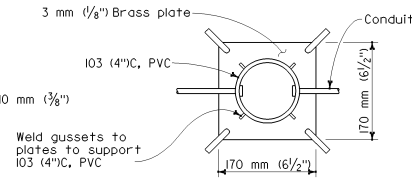
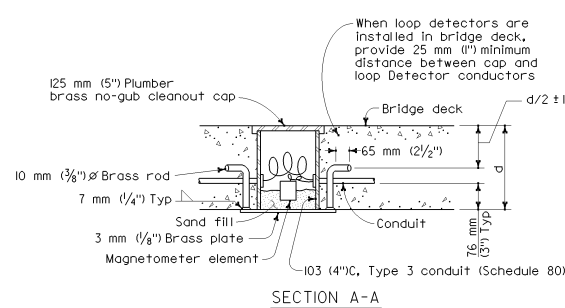
NO SCALE

ES-5C

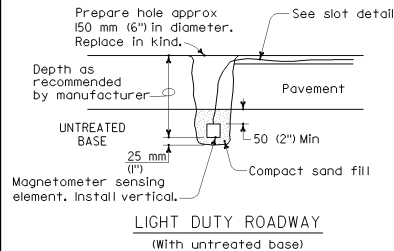
DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
Theresa Gabriel REGISTERED PROFESSIONAL ENGINEER No. E15129 Exp. 6-30-04 ELECTRICAL STATE OF CALIFORNIA			July 1, 2002 PLANS APPROVAL DATE The State of California or its officers or agents shall not be responsible for the accuracy or completeness or electronic copies of this plan sheet. Caltrans now has a web site! To get to the web site, go to http://www.dot.ca.gov		



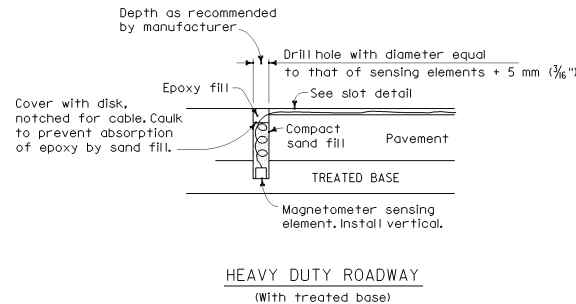
**INSTALLATION DETAIL
IN BRIDGE DECK**



**DETECTOR INSTALLATION IN
BRIDGE DECK**



**LIGHT DUTY ROADWAY
(With untreated base)**



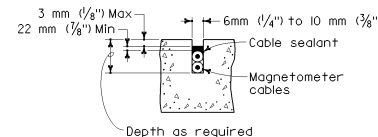
**HEAVY DUTY ROADWAY
(With treated base)**

**MAGNETOMETER SENSING ELEMENT
INSTALLATION DETAILS**

MAGNETOMETER DETECTOR INSTALLATION PROCEDURE

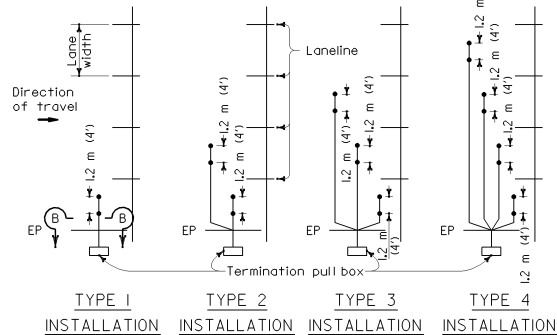
1. Prepare holes for sensing elements and saw slots in pavement for magnetometer cables as shown in details. Slots shall be washed until cleaned. Blow out and dry thoroughly with compressed air.
2. Install termination pull box. See termination details.
3. Install heads in holes and install cables in slots using 5 mm (3/16") to 6 mm (1/4") wood paddle and run to adjacent pull box allowing 1.5 m (5') of slack at the pull box. Hold cables with wood paddles at the bottom of the sawed slot during sealant placement.
4. Identify cables by lane or sensor unit designation.
5. Splice magnetometer cables to lead-in-cables. All splices shall be soldered using rosin core solder.
6. Test each sensing element circuit at controller or count station cabinet before filling holes and slots. Excitation circuits shall have a resistance of 50 Ω * per head and detection circuits shall have a resistance of 300 Ω * per head. Measurements shall be made with a low range ohmmeter.
7. Fill slots and sensing element holes as shown in details.
8. Lead-in-cable shall not be spliced between the termination pull box and the controller cabinet terminals.
9. See Standard Plan ES-5E for curb termination details.

*Or other resistance per manufacturer's specifications



SECTION B-B

SLOT DETAIL



LAYOUTS AND DIMENSIONS

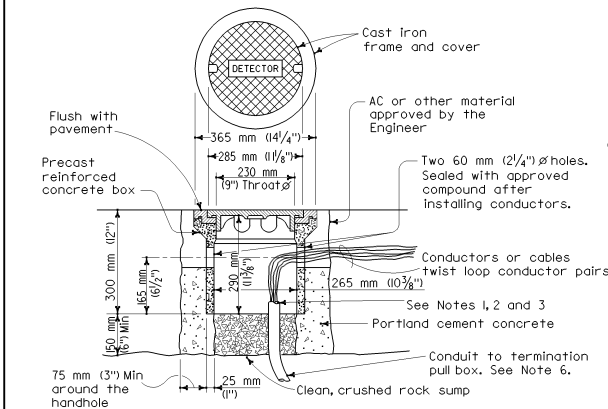
STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION SIGNAL, LIGHTING AND ELECTRICAL SYSTEMS DETECTORS

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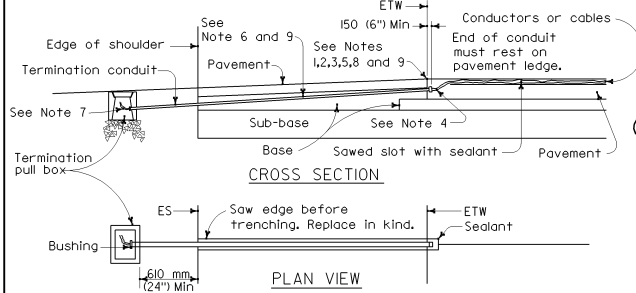
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ES-5D

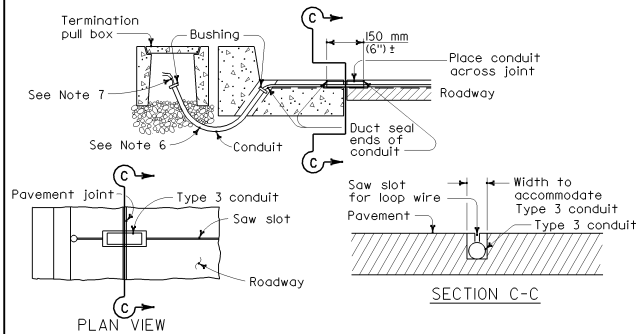
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TOTAL PROJECT			TOTAL PROJECT		TOTAL PROJECT	
No. 6-50-04			No. 6-50-04		No. 6-50-04	
DATE OF THIS SHEET			DATE OF THIS SHEET		DATE OF THIS SHEET	
Theresa A. Gabriel			Theresa A. Gabriel		Theresa A. Gabriel	
REGISTERED PROFESSIONAL ENGINEER			REGISTERED PROFESSIONAL ENGINEER		REGISTERED PROFESSIONAL ENGINEER	
July 1, 2002			July 1, 2002		July 1, 2002	
PLANS APPROVAL DATE			PLANS APPROVAL DATE		PLANS APPROVAL DATE	
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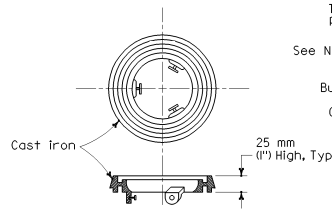
TYPE A DETECTOR HANDHOLE DETAILS



SHOULDER TERMINATION DETAILS

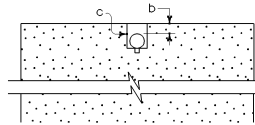


CURB TERMINATION DETAILS TYPE B

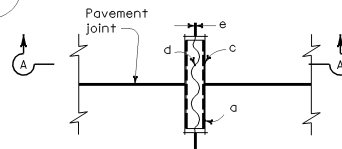
CURB TERMINATION DETAILS
TYPE A

NOTE:
Use for Type A detector handhole on pavement resurfacing only.

LOCKING GRADE RING



SECTION A-A



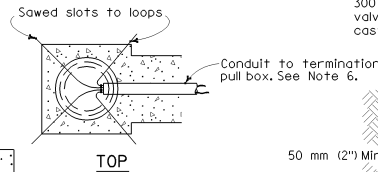
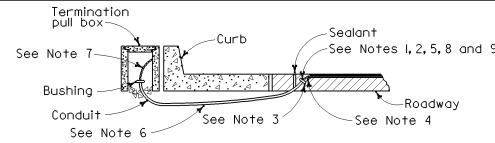
PLAN VIEW

TYPICAL LOOP LEAD-IN DETAILS
AT PAVEMENT JOINT

NOTES: (This sheet only)

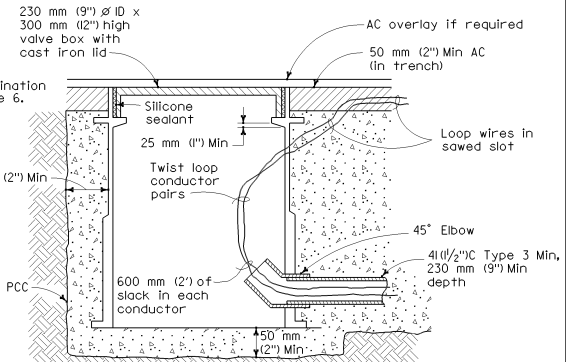
1. Bushing shall be used at roadway end of conduit.
2. Tape detector conductors or cables 75 mm (3 inches) each side of bushing.
3. Install duct seal compound to each end of termination conduit before installing sealant.
4. Round all sharp edges where detector conductors or cables have to pass.
5. End of conduit shall be 80 mm (3 1/8 inches) below roadway surface.
6. Conduit size

Conduit size	Loop Conductors	Magnetometer Cables
27 (1 inch) Minimum	1 to 2 pairs	1 to 3 cables
41 (1 1/2 inch) Minimum	3 to 4 pairs	4 to 8 cables
53 (2 inch) Minimum	5 or more pairs	9 or more cables
7. Splice detector conductors or cables to lead-in-cable run to controller cabinet.
8. Location of detector handhole when shown on plans.
9. When the shoulder and traveled way are paved with the same material and there is no joint between them, the conduit shall extend only 600 mm (24 inches) into the shoulder pavement.



TOP

- a. 21 (3/4 inch) Type 3 conduit 150 mm (6 inches) long minimum, plug both ends with caulking compound to keep out sealant.
- b. 13 mm (1/2 inch) minimum between top of conduit and pavement surface.
- c. Saw cut shall not exceed 25 mm (1 inch) in width and 3 mm (1/8 inch) longer than conduit to be installed.
- d. Conductors with 13 mm (1/2 inch) minimum slack inside conduit.
- e. Inductive loop detector saw slot.



TYPE B DETECTOR HANDHOLE DETAILS

INSTALLATION REQUIREMENTS

TYPE B DETECTORS HANDHOLE

1. Outline of trench shall be saw cut to a minimum depth of 80 mm (3 1/8 inches) except where asphalt concrete overlay is to be placed.
2. The valve box shall be fabricated of calcium carbonate and polyester resins with fiberglass reinforcement and designed for heavy traffic loads.
3. Cast iron lid shall be marked "Detector" and shall be secured in place by applying waterproof silicone sealant. Valve box shall be centered on lane line, unless otherwise shown on the plans.
4. Entire length of trench, from valve box to adjacent pull box, shall be backfilled with portland cement concrete except the top 50 mm (2 inches) in asphalt concrete surfaced roadways shall be backfilled with asphalt concrete.

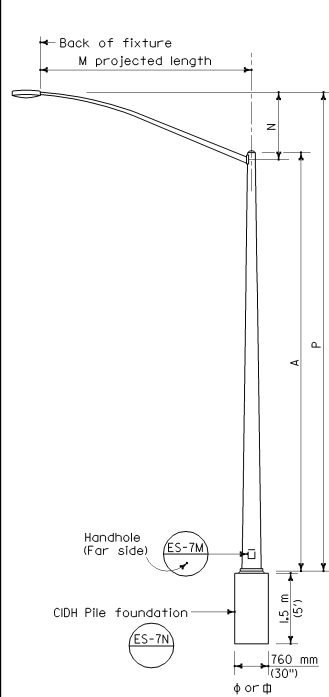
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DEPARTMENT OF TRANSPORTATION
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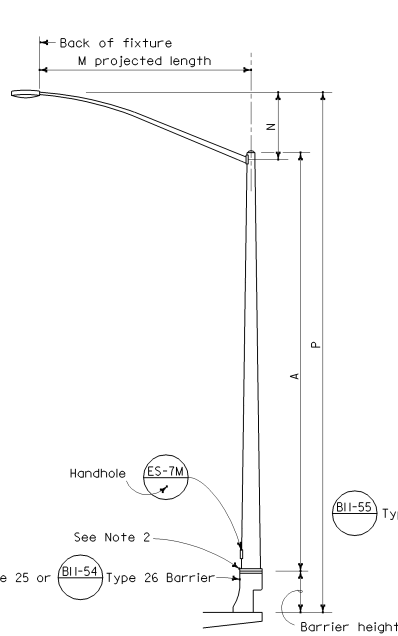
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ES-5E

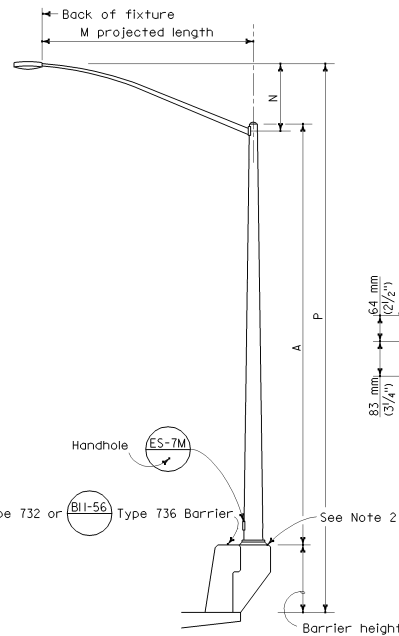
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Theresa Gabriel REGISTERED PROFESSIONAL ENGINEER No. E15123 Exp. 6-30-04 STATE OF CALIFORNIA					
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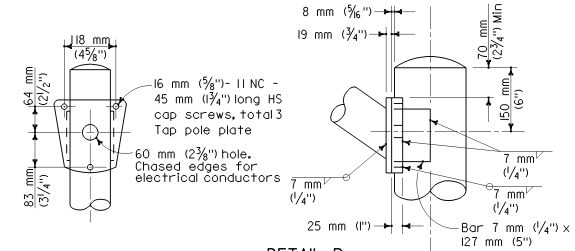
ELEVATION
TYPE 15
TYPE 22



ELEVATION
TYPE 15 BARRIER RAIL MOUNTED
TYPE 21 BARRIER RAIL MOUNTED

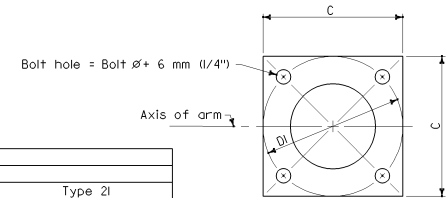


ELEVATION
TYPE 15 BARRIER RAIL MOUNTED
TYPE 21 BARRIER RAIL MOUNTED



DETAIL R
LUMINAIRE ARM CONNECTION

HIGH STRENGTH CAP SCREWS
16 mm (5/8 inch) - 11 NC - 45 mm (1 3/4 inch) long HS cap screws, total 3 Tap pole plate
60 mm (2 3/8 inch) hole, chased edges for electrical conductors
7 mm (1/4 inch) hole
25 mm (1 inch) hole
7 mm (1/4 inch) hole
127 mm (5 inch) hole



BASE PLATE

POLE TYPE	POLE DATA				BASE PLATE DATA				LUMINAIRE ARM (See Arm Data m)
	A Height	MIN OD		Wall Thickness	C	DI Bolt Circle	Thick-ness	Anchor Bolts Size	
		Base	Top						
15	9.1m (30') (35")	203 mm (8")	98 mm (3 7/8") (10.1196")	3.04 mm (10.1196")	305 mm (12")	280 mm (11")	25 mm (1")	25 mm ϕ x 920 mm x 102 mm * (1 1/4" ϕ x 36" x 4")	1.8-4.6 [3.7]
21	10.7 m (35') (42")	219 mm (8 5/8")	98 mm (3 7/8") (10.1196")	3.04 mm (10.1196")	305 mm (12")	305 mm (12")	25 mm (1")	32 mm ϕ (1 1/4") ϕ see Note 2	1.8-4.6 [3.7]
22	10.7 m (35') (42")	219 mm (8 5/8")	98 mm (3 7/8") (10.1196")	3.04 mm (10.1196")	305 mm (12")	305 mm (12")	25 mm (1")	32 mm ϕ x 920 mm x 102 mm (1 1/4" ϕ x 36" x 4")	1.8-4.6 [3.7]

*For barrier rail mount, see Note 2.

LUMINAIRE ARM DATA									
M Projected Length	N Rise	Min OD At Pole	Nominal Thickness	P Mounting Height				Type 15 [80 mm (3 1/4") Barrier]	Type 21 [80 mm (3 1/4") Barrier]
				Type 15	Type 22	Type 15 [80 mm (3 1/4") Barrier]	Type 21 [80 mm (3 1/4") Barrier]		
1.8 m (6')	610 mm (24") \pm	83 mm (3 1/4") \pm	3.04 mm (0.1196") \pm	9.6 m (31.5') \pm	11.4 m (36.5') \pm	10.4 m (34.1') \pm	11.9 m (39.17') \pm		
2.4 m (8')	760 mm (30") \pm	89 mm (3 1/2") \pm	3.04 mm (0.1196") \pm	9.8 m (32.0') \pm	11.3 m (37.0') \pm	10.5 m (34.4') \pm	12.1 m (39.67') \pm		
3.1 m (10')	990 mm (39") \pm	98 mm (3 7/8") \pm	3.04 mm (0.1196") \pm	10.0 m (32.75') \pm	11.5 m (37.75') \pm	10.7 m (35.1') \pm	12.3 m (40.42') \pm		
3.7 m (12')	1290 mm (51") \pm	98 mm (3 7/8") \pm	3.04 mm (0.1196") \pm	10.3 m (33.75') \pm	11.8 m (38.75') \pm	11.0 m (36.1') \pm	12.6 m (41.42') \pm		
4.6 m (15')	1450 mm (57") \pm	108 mm (4 1/4") \pm	3.04 mm (0.1196") \pm	10.4 m (34.25') \pm	12.0 m (39.25') \pm	11.2 m (36.7') \pm	12.8 m (41.92') \pm		

NOTES:

1. ☐ Indicates arm length to be used unless otherwise noted on the plans.

2. For anchorage details see (ES-6B).

3. See (ES-6B) when Type 15 is to be mounted on bridge railing.

4. For Type 15-SB, use Type 15 standard with Type 30 base plate details, see Standard Plan ES-6F.

5. For additional notes see Standard Plan ES-7M and ES-7N.


6. For Type 15-SBI, see Standard Plan ES-6C.

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION LIGHTING STANDARDS TYPES 15, 21 AND 22


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NO SCALE

ES-6A

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
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DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS


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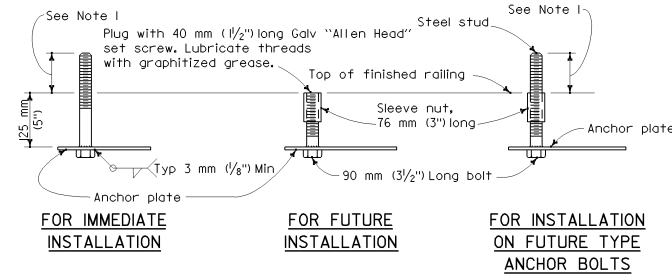
JEFFREY S. WOODY

REGISTERED CIVIL ENGINEER

NO. C41260

Exp. 3-31-03

STATE OF CALIFORNIA



DETAIL B
ELECTROLIER ANCHOR BOLTS

NOTES:

1. Anchor bolt or stud length shall be such that thread extends 13 mm (1/2") maximum above nut on level base plate after grouting. See Detail "N".
2. Electrolier anchor bolts shall be held in position for pouring by means of anchor plates and suitable templates. Deviation from the true position, vertical and height, shall not exceed 15 mm (1/2").
3. See railing sheets for reinforcement and structural details at electroliers and pull boxes.

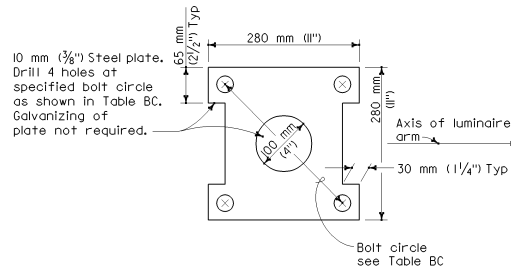
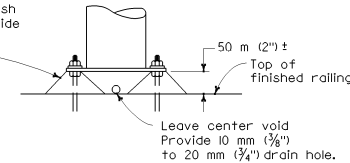


TABLE BC

Type	Bolt Circle	Anchor Bolt Diameter
15	280 mm (11")	25 mm (1")
21	305 mm (12")	32 mm (1 1/4")

ANCHOR PLATE

After plumbing standard, place mortar all around bolts. Finish with 45° to 90° slope. Provide 10 mm (3/8") to 20 mm (3/4") drain hole at low point.



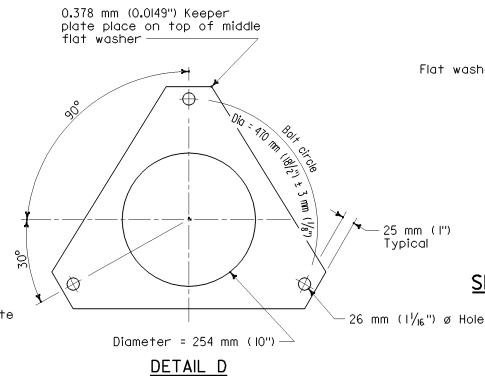
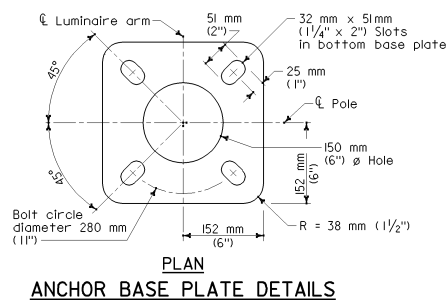
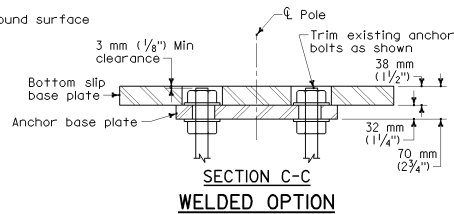
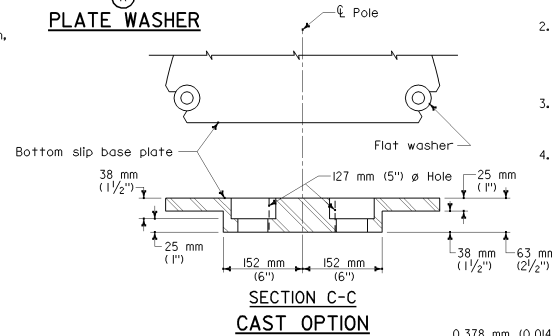
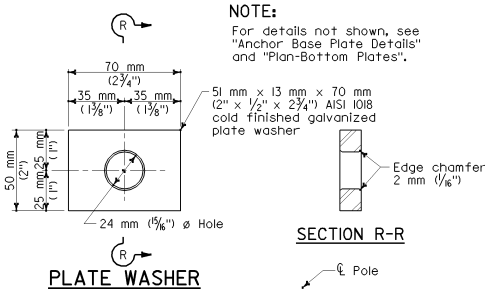
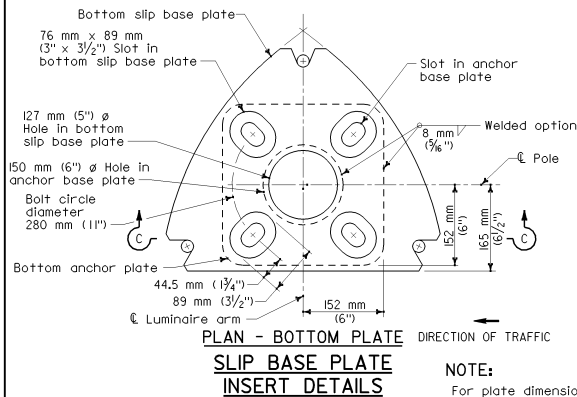
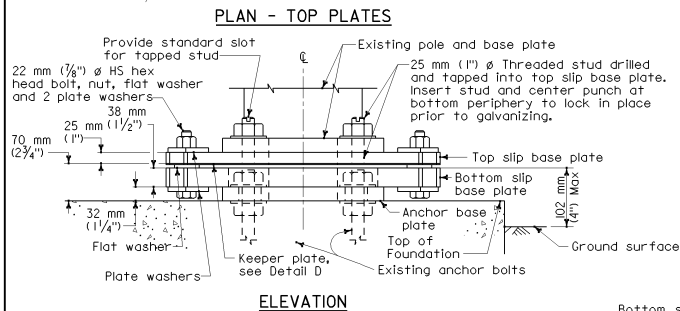
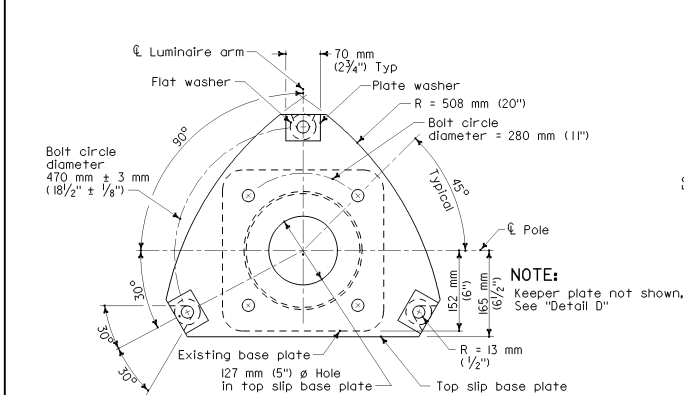
DETAIL N
GROUTING AT ELECTROLIER

STATE OF CALIFORNIA
 DEPARTMENT OF TRANSPORTATION
LIGHTING STANDARDS
TYPES 15 AND 21
BARRIER RAIL MOUNTED DETAILS

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NO SCALE

ES-6B



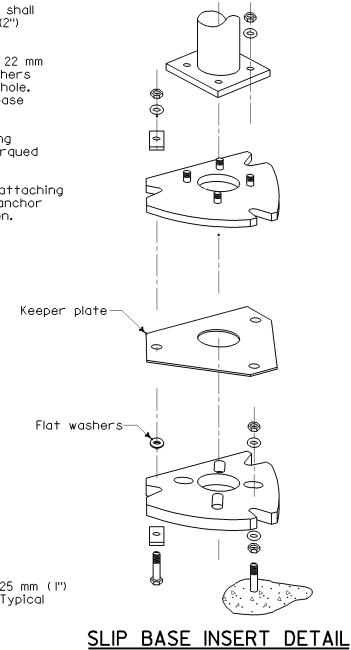
DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

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REGISTERED PROFESSIONAL ENGINEER
 Jeffrey S. Moody
 No. C41260
 Exp. 3-31-03
 STATE OF CALIFORNIA

NOTES:

1. Conduit riser (including bushing) shall protrude no more than 50 mm (2") above top of foundation.
2. When existing anchor bolts are 22 mm (7/8") ϕ , provide 2 hardened washers of 57 mm (2 1/4") ϕ at each slot hole. Place on each side of anchor base plate.
3. Nuts on 22 mm (7/8") ϕ HS clamping bolts shall be lubricated and torqued as per specifications.
4. Torque requirements for nuts attaching anchor base plate to existing anchor bolts are waived. Wrench tighten.

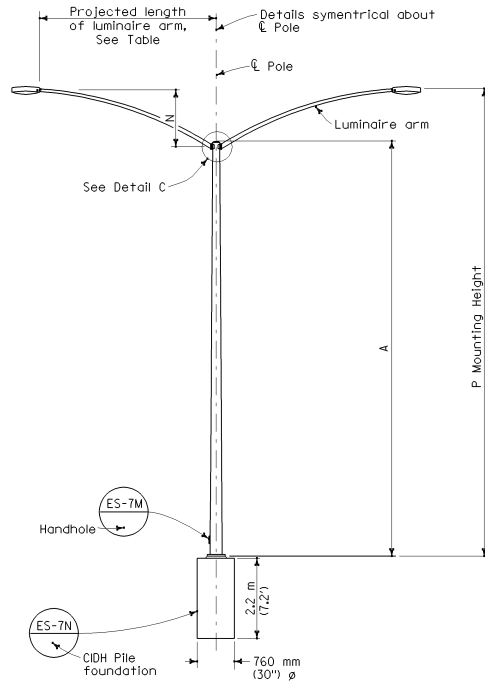


STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION LIGHTING STANDARDS TYPE 15 SLIP BASE INSERT

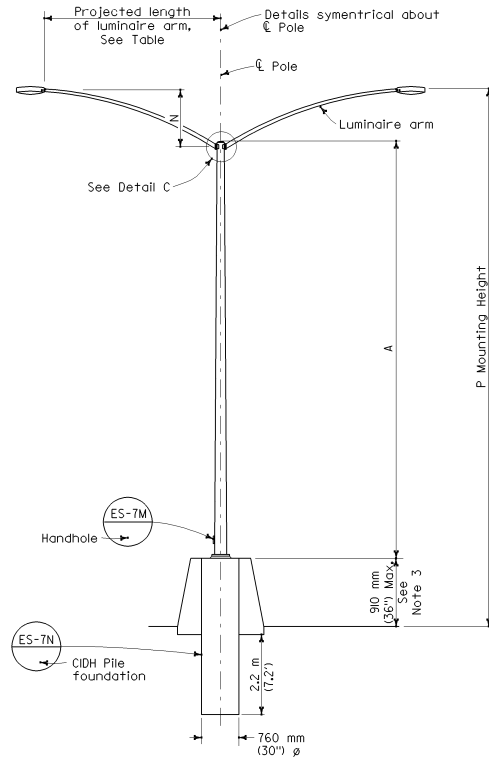
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NO SCALE

ES-6C



ELEVATION
TYPE 15D
TYPE 22D



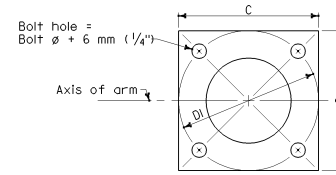
ELEVATION
TYPE 15D MEDIAN BARRIER MOUNTED
TYPE 21D MEDIAN BARRIER MOUNTED

POLE TYPE	POLE DATA				BASE PLATE DATA				
	A Height	Min OD		Min Thickness	C	DI Bolt Circle	Thick-ness	Anchor Bolts	
		Base	Top					Size	Bolt Circle
15D	9.1 m (30')	203 mm (8")	98 mm (3 7/8")	4.55 mm (0.1793")	305 mm (12")	305 mm (12")	25 mm (1")	32 mm ϕ x 1067 mm x 152 mm (1 1/4" ϕ x 42" x 6")	305 mm (12")
21D	10.7 m (35')	219 mm (8 5/8")	98 mm (3 7/8")	4.55 mm (0.1793")					
22D	10.7 m (35')	219 mm (8 5/8")	98 mm (3 7/8")	4.55 mm (0.1793")					

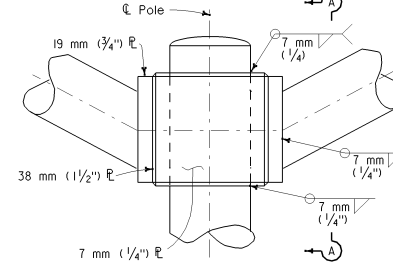
NOTES

- Indicates arm length to be used unless otherwise noted on the plans.
- For additional notes, see Standard Plan ES-7M.
- See Concrete Barrier Details Type 50E, 60E and 60SE.

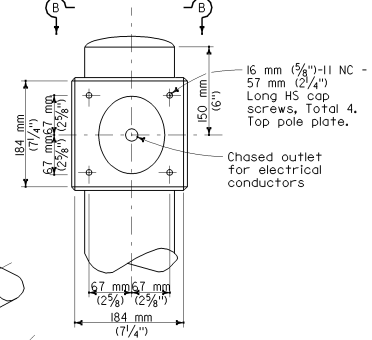
LUMINAIRE ARM DATA									
Projected Length	N Rise	Min OD at Pole	Nominal Thickness	P Mounting Height					
				Type 15D	Type 22D	Type 15D 910 mm (36") Barrier	Type 21D 910 mm (36") Barrier	Type 22D 910 mm (36") Barrier	Type 21D 910 mm (36") Barrier
1.8 m (6')	610 mm (24")	83 mm (3 1/4")	3.04 mm (0.1196")	9.6 m (31.5') \pm	11.1 m (36.5') \pm	10.5 m (34.5') \pm	12.0 m (39.4') \pm	12.0 m (39.4') \pm	12.0 m (39.4') \pm
2.4 m (8')	760 mm (30")	89 mm (3 1/2")	3.04 mm (0.1196")	9.8 m (32.0') \pm	11.3 m (37.0') \pm	10.7 m (35.1') \pm	12.2 m (40.0') \pm	12.2 m (40.0') \pm	12.2 m (40.0') \pm
3.1 m (10')	990 mm (39")	98 mm (3 7/8")	3.04 mm (0.1196")	10.0 m (32.75') \pm	11.5 m (37.75') \pm	10.9 m (35.8') \pm	12.4 m (40.7') \pm	12.4 m (40.7') \pm	12.4 m (40.7') \pm
3.7 m (12')	1290 mm (51")	98 mm (3 7/8")	3.04 mm (0.1196")	10.3 m (33.75') \pm	11.8 m (38.75') \pm	11.2 m (36.7') \pm	12.7 m (41.7') \pm	12.7 m (41.7') \pm	12.7 m (41.7') \pm



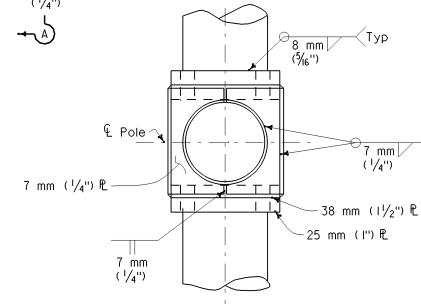
BASE PLATE



DETAIL C



SECTION A-A



SECTION B-B

HIGH STRENGTH CAP SCREWS
16 mm (5/8") - UNC - 45 mm (1 3/4")
Length, mm (inches)
Threads per inch
Size, mm (inches)

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION **LIGHTING STANDARDS** **TYPE 15D, 21D AND 22D** **DOUBLE LUMINAIRE ARM**

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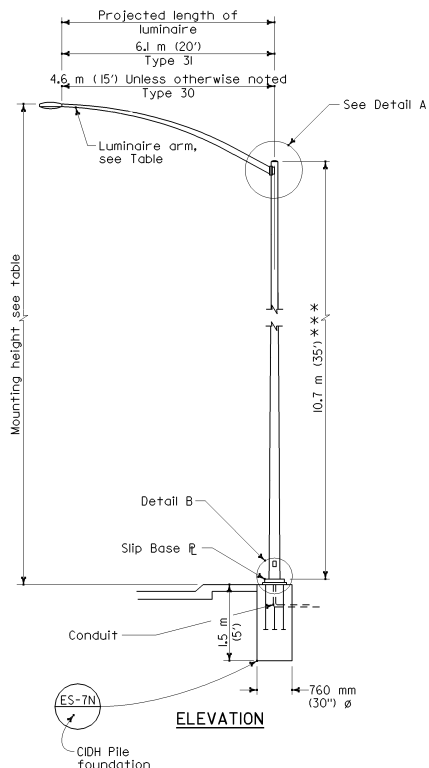
NO SCALE

ES-6D

LUMINAIRE ARM DATA

PROJECTED LENGTH	THICKNESS	MINIMUM OD @ POLE	MOUNTING HEIGHT
* 1.8 m (6')		83 mm (3 1/4")	11.2 m (36.75') ±
2.4 m (8')		89 mm (3 1/2")	11.4 m (37.25') ±
3.1 m (10')	3.04 mm (0.1196")	95 mm (3 3/4")	11.6 m (38.0') ±
3.7 m (12')		95 mm (3 3/4")	11.9 m (39.0') ±
4.6 m (15')		108 mm (4 1/4")	12.0 m (39.5') ±
** 6.1 m (20')	4.55 mm (0.1793")	127 mm (5")	11.3 m (37.0') ±

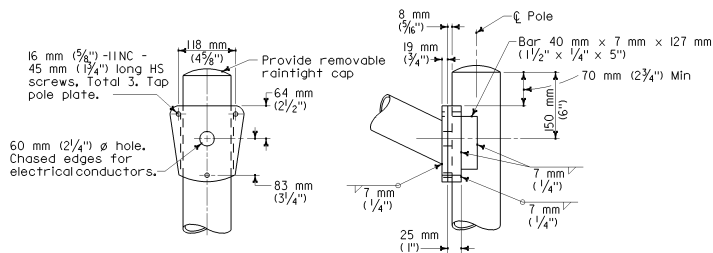
- * Type 30 - arm length 1.8 m (6') - 4.6 m (15') maximum
- ** Type 31 - arm lengths 6.1 m (20')



ELEVATION

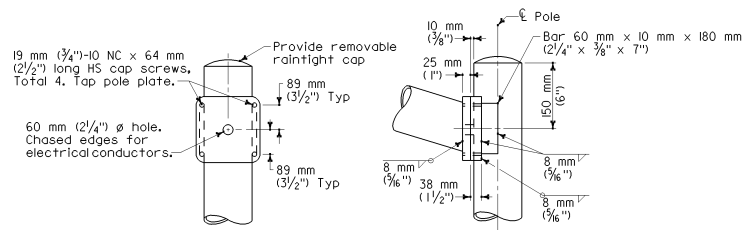
**Type 31 round tapered steel pole 152 mm x 273 mm (6" x 10 3/4") Min OD x 10.7 m (35') wall thickness 4.55 mm (0.1793").

Type 30 round tapered steel pole 98 mm x 222 mm (3 7/8" x 8 3/4") Min OD x 10.7 m (35') wall thickness 3.04 mm (0.1196").

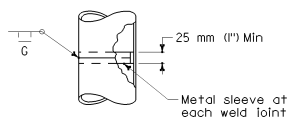


DETAIL A - TYPE 30

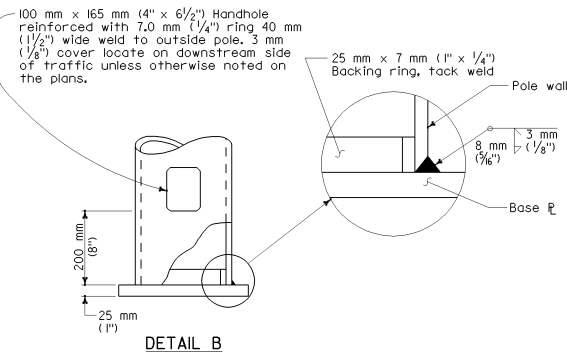
HIGH STRENGTH CAP SCREWS
16 mm (5/8") - UNC - 45 mm (1 3/4")
Length, mm (inches)
Threads per inch
Size, mm (inches)



DETAIL A - TYPE 31



POLE SPLICE



DETAIL B

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION LIGHTING STANDARDS TYPES 30 AND 31

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NO SCALE

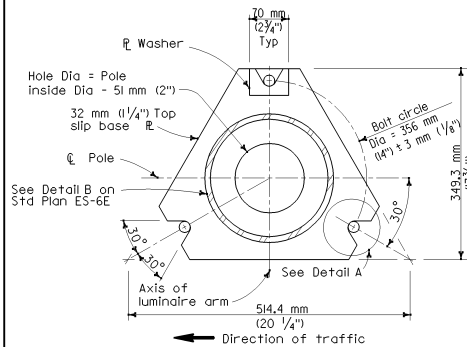
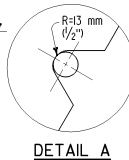
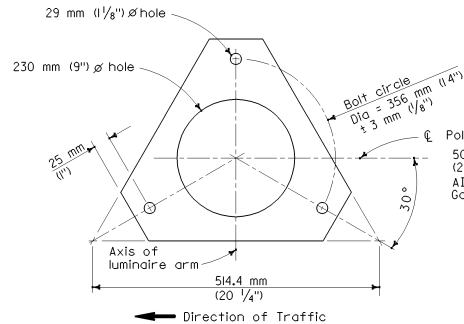
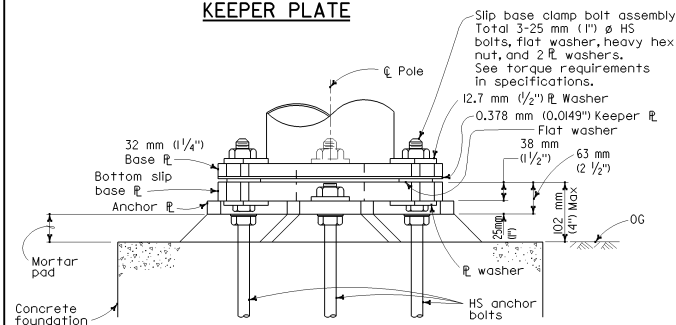
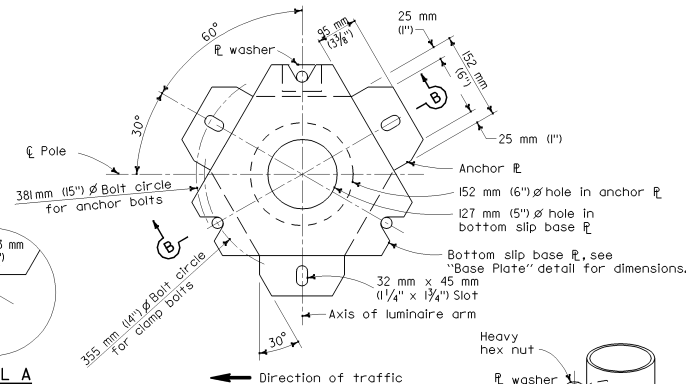
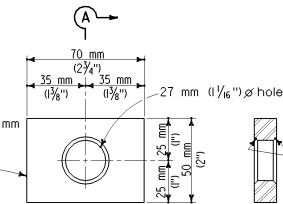
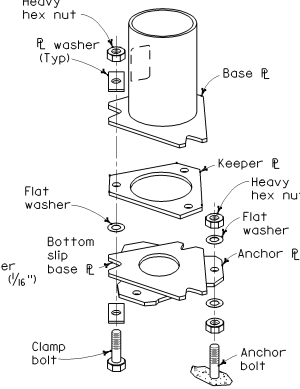
ES-6E

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

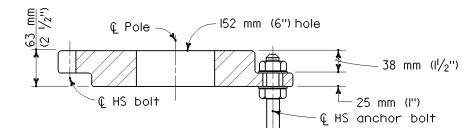
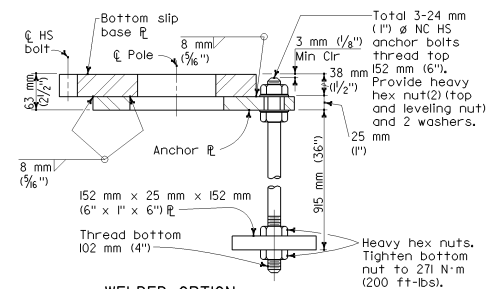
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NOTES

- Sheet steel shall have a minimum yield of 276 MPa (40,000 pounds per square inch)
- For slip base details, see Standard Plan ES-6F.
- For Type 30 fixed base, use Type 22 base plate, anchor bolts and foundation on Standard Plan ES-6A.
- For Type 31 fixed base, use Type 32 base plate, anchor bolts and foundation on Standard Plans ES-6G.
- Handhole shall be located on downstream side of traffic unless noted otherwise on plans.
- For additional general notes, refer to Standard Plan ES-7M.

**BASE PLATE****DETAIL A****KEEPER PLATE****ELEVATION - SLIP BASE****BOTTOM PLATES****PLATE WASHER****SECTION A-A****SLIP BASE DETAIL****ELEVATION****NOTES:**

1. 25 mm (1") ϕ HS anchor bolts, wrench tighten, torque requirements waived. For clamp bolts, see specifications.
2. Conduit shall not protrude more than 50 mm (2") above top of foundation.
3. Locate handhole on downstream side of traffic.
4. For Type 30 fixed base, use Type 22 foundation and base plate details. For Type 31 fixed base, use Type 32 foundation and base plate details.

**CAST OPTION****WELDED OPTION****SECTION B-B**


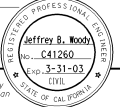
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**LIGHTING STANDARDS
TYPES 30 AND 31
BASE PLATE DETAILS**

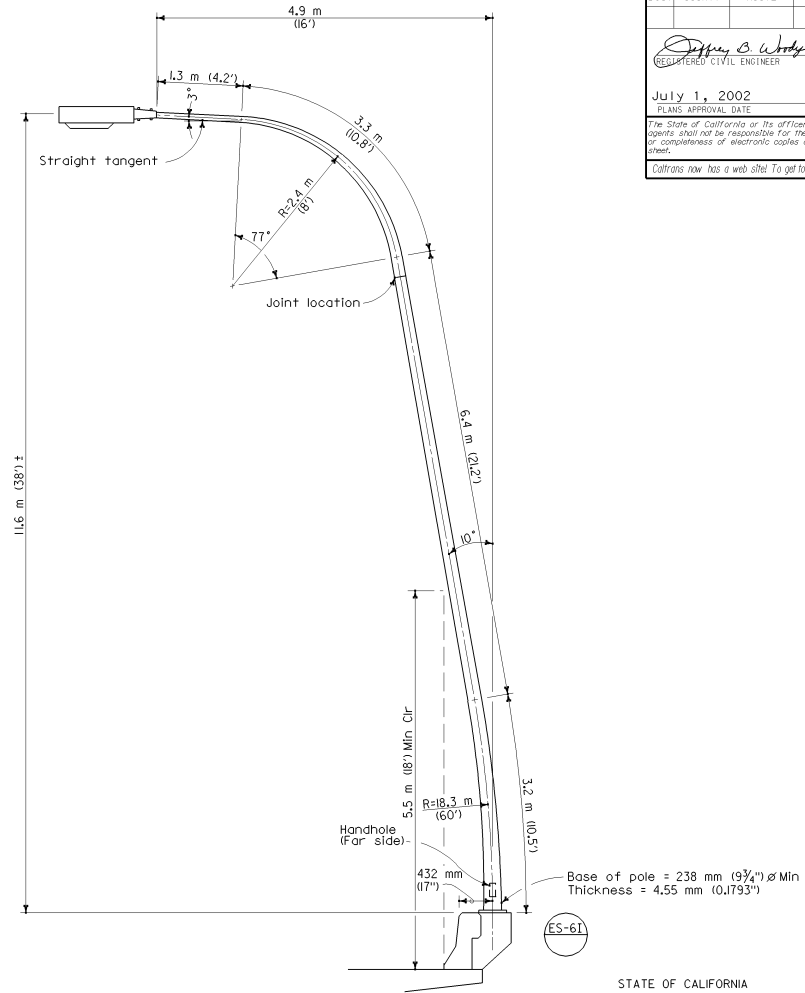
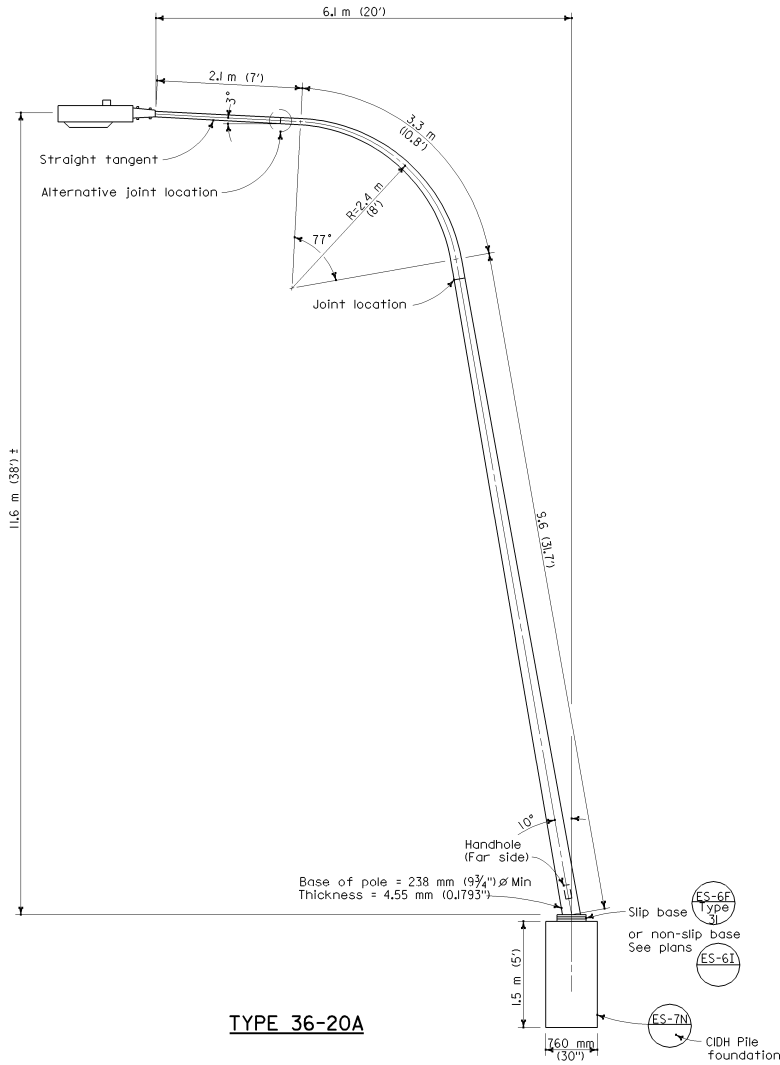
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NO SCALE

ES-6F

DIST.	COUNTY	ROUTE	KILOMETER	POST	SHEET	TOTAL
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<p>JEFFREY B. WOODY No. C41260 Exp. 3-31-03 STATE OF CALIFORNIA</p>						

DIST.	COUNTY	ROUTE	KILOMETER TOTAL	POST PROJECT	SHEET NO.	TOTAL SHEETS
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STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**LIGHTING STANDARDS
TYPES 35 AND 36-20A,
10 DEGREE TYPE**

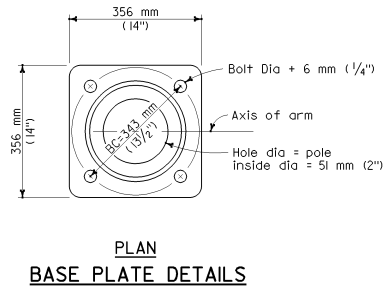
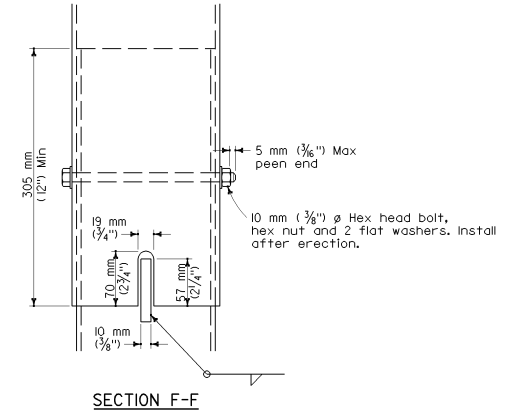
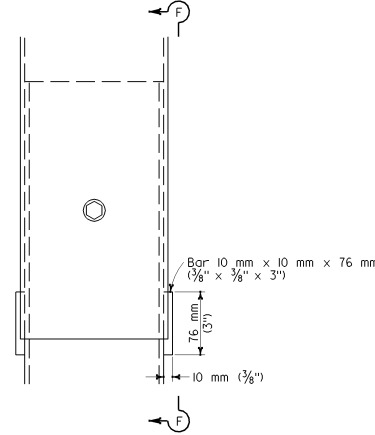
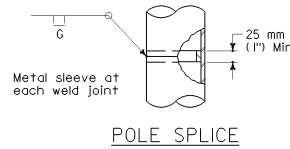
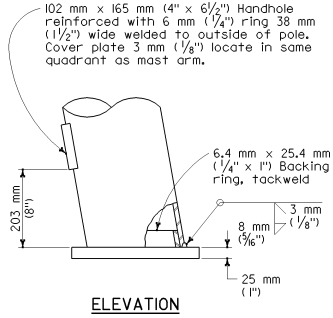
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NO SCALE

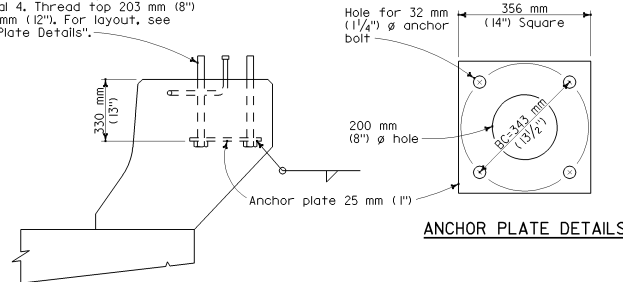
ES-6H

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
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 Jeffrey S. Woody
 No. C41260
 Exp. 3-31-03
 CIVIL
 STATE OF CALIFORNIA



32 mm ϕ x 460 mm (1 1/4" ϕ x 18") Bolt, total 4. Thread top 203 mm (8") Galv 305 mm (12"). For layout, see "Anchor Plate Details".



ANCHOR DETAILS
Type 35

NOTES

1. Pole and arm configurations shown are the final form when erected in place. Provide camber as necessary.
2. Poles and arms shall be round, tapered steel tubes with a taper of 11.45 mm/m to 11.67 mm/m (0.375" to 0.400" per foot)
3. Alternative slip joint or sleeve joint designs may be submitted with calculations to the Engineer for approval.
4. Knee radius 2.4 m (8') Min - 3.1 m (10') Max.
5. Tube bends shall be made in a manner to prevent buckling or crimping.
6. A 2 NPS (2") pipe tenon, 203 mm (8") maximum long may be used for the luminaire connection.

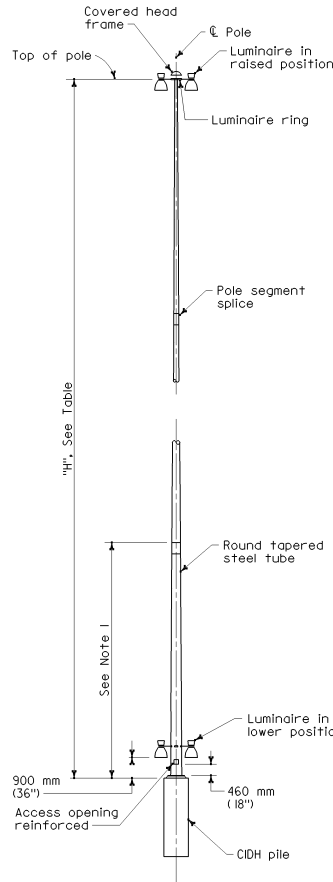
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**LIGHTING STANDARDS
TYPES 35 AND 36-20A,
10 DEGREE TYPE
DETAILS**

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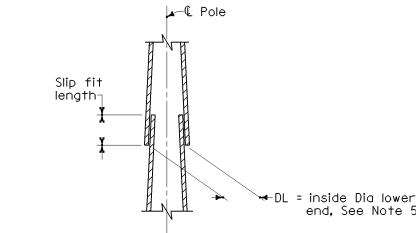
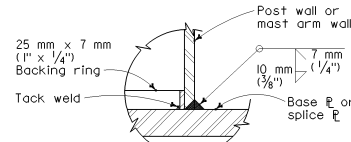
NO SCALE

ES-61

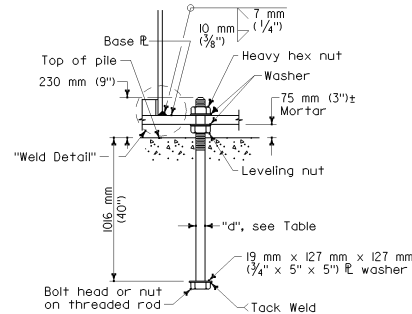
POST TYPE	POLE DATA mm (in)			BASE PLATE DATA mm (in)					CIDH PILE DATA		
	Height "H" mm (ft)	Min OD Base	Min Thickness Base	Dia	Thickness	Anchor Bolts			"D" mm (in)	"L" mm (ft)	Pile Reinf
						Total	Size "d"	BC			
HM 80	24.4 m (80')	457 mm (18")	4.8 mm (0J875")	775 mm (30 1/2")	51 mm (2")	4	51 mm (2")	635 mm (25")	1070 mm (42")	3.0 m (10')	10-#25M (#8)
HM 100	3.05 m (100')	495 mm (19 1/2")	4.8 mm (0J875")	775 mm (30 1/2")	51 mm (2")	6	51 mm (2")	635 mm (25")	1070 mm (42")	3.3 m (11')	13-#25M (#8)
HM 120	36.6 m (120')	565 mm (22 1/4")	6.4 mm (0.250")	953 mm (37 1/2")	51 mm (2")	6	51 mm (2")	812 mm (32")	1220 mm (48")	3.6 m (12')	20-#25M (#8)
HM 160	48.8 M (160')	673 mm (26 1/2")	6.4 mm (0.250")	1092 mm (43")	64 mm (2 1/2")	6	64 mm (2 1/2")	914 mm (36")	1370 mm (54")	4.5 m (15')	25-#25M (#8)



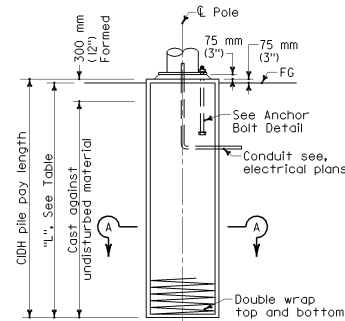
POLE DETAILS

POLE SEGMENT SPLICE DETAIL
See Note 5

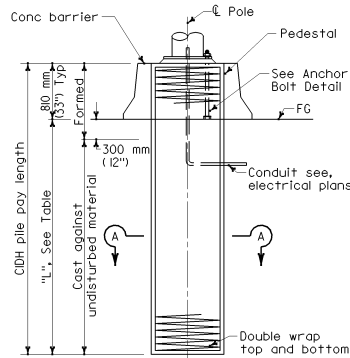
WELD DETAIL



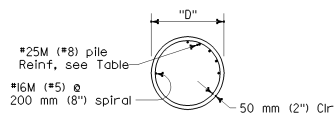
ANCHOR BOLT DETAIL

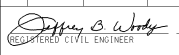


TYPICAL ELEVATION

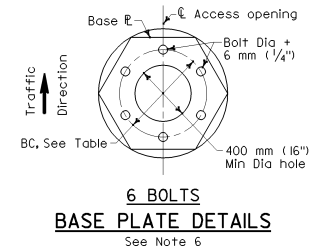
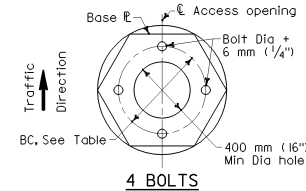


MEDIAN LOCATION

SECTION A-A
CIDH PILE DETAILS

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
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BASE PLATE DETAILS
See Note 6

NOTES

1. Pole details shall suit the lowering device and this foundation plan. Pole details shall be submitted to the Engineer for approval.
2. Pole finish shall be galvanized.
3. For number of luminaires to be mounted on the pole, see Electrical Plans.
4. Foundation design is based on a maximum of 10 luminaires. Design wind velocity 129 km/h (80 mph).
5. Slip fit length shall not be less than 1.5 DL minus 50 mm (2").
6. Base plate shape is optional.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
LIGHTING STANDARDS
24.4 m (80') TO 48.8 m (160')
HIGH MAST LIGHT POLE
FOUNDATION DETAILS

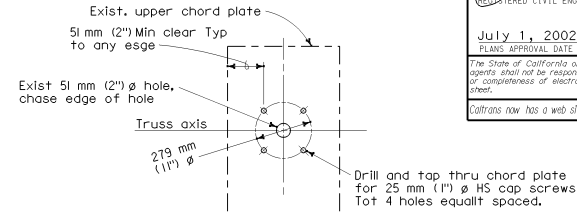
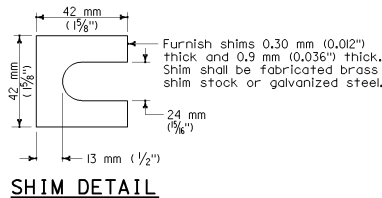
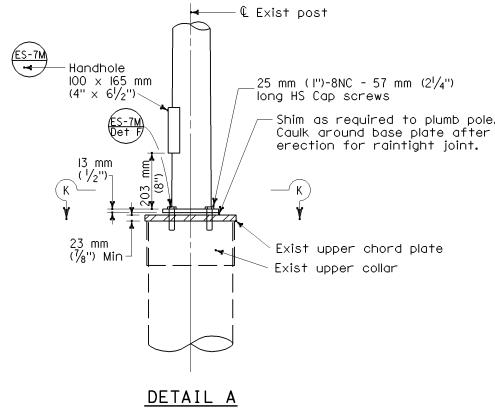
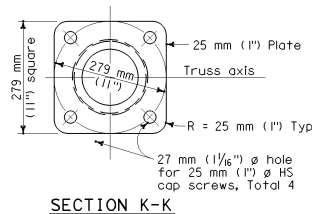
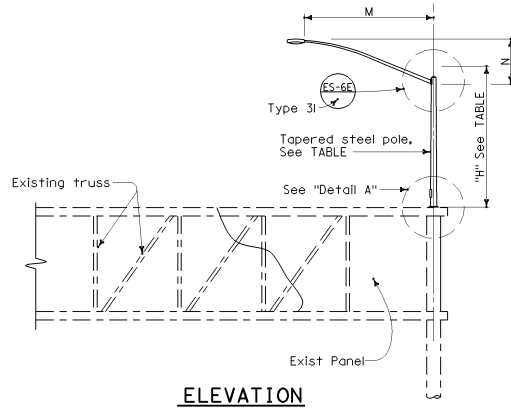
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NO SCALE

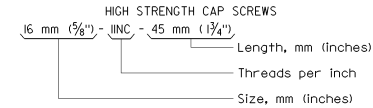
ES-6J

LUMINAIRE ARM DATA			
M Projected Length	N Rise	Min OD at Pole	Nominal Thickness
4.6 m (15')	1450 mm (51") ±	108 mm (4 1/4")	3.04 mm (0.1193")
6.1 m (20')	750 mm (30") ±	127 mm (5")	4.55 mm (0.1793")

Pole Extension Type	POLE DATA			
	A Height	Min OD		Min Thickness
		Base	Top	
Type 5	1.5 m (5')	165 mm (6 1/2")	152 mm (6")	4.55 mm (0.1793")
Type 10	3.0 m (10')	184 mm (7 1/4")	152 mm (6")	4.55 mm (0.1793")



UPPER CHORD PLATE ST



GENERAL NOTES:

SPECIFICATIONS

Design: AASHTO specifications for the design and construction of structural supports for highway signs, dated 1994.

LOADING

Wind Loadings: 129 km/h (80 mph) AASHTO

UNIT STRESSES

Structural Steel: $f_y = 331 \text{ MPa}$ (48,000 psi) tapered steel tube (pole)
 $f_y = 248 \text{ MPa}$ (36,000 psi) unless otherwise noted

NOTES:

1. The Contractor shall verify all controlling field dimensions before ordering or fabricating any material.
2. All steel shall be galvanized after fabrication.
3. Bolt hole locations may vary at the discretion of the Engineer.

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION LIGHTING STANDARDS TYPE 5 AND TYPE 10 OVERHEAD SIGN MOUNTED

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NO SCALE

ES-6K

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

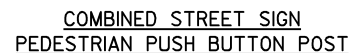
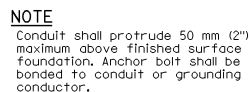
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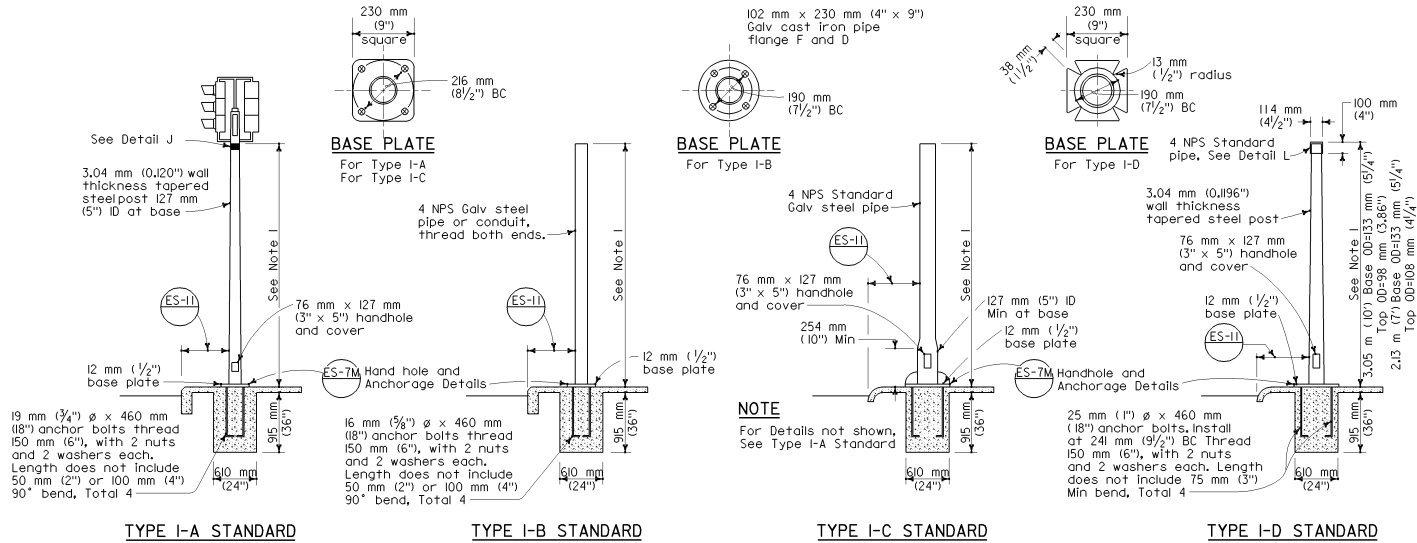
NOTE
Pipe dimensions are nominal. See ASTM A6M.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
SIGNAL STANDARDS
PUSH BUTTON POSTS

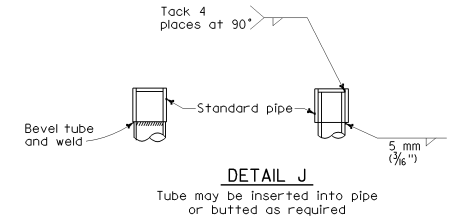
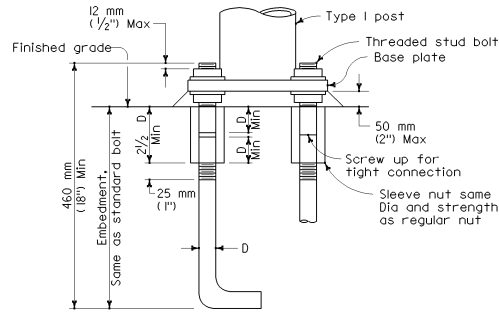
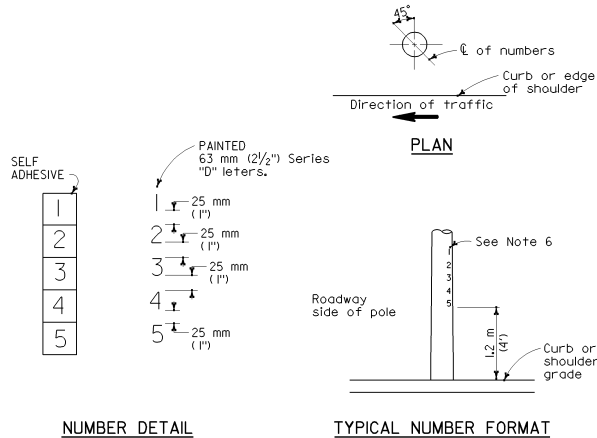
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NO SCALE

ES-7A



TYPE I SIGNAL STANDARDS



DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

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NOTES

- Standards shall be 3.05 m \pm 50 mm (10' \pm 2") for vehicle signals and 2.13 m \pm 50 mm (7' \pm 2") for pedestrian signals unless otherwise noted on plans.
- Top of standards shall be 114 mm (4 1/2") OD.
- Conduits shall extend 50 mm (2") maximum above finished surface of foundation and for Types I-A, I-C and I-D shall be sloped toward handhole.
- Anchor bolts shall be bonded to conduit or grounding conductor.
- Conduit between standard and adjacent pull box shall be Size 53 (2") minimum.
- Point numbers on roadway side facing traffic when electrifier or post is left of direction of traffic.

SIGNAL AND LIGHTING STANDARDS TYPE 1 STANDARDS AND EQUIPMENT NUMBERING

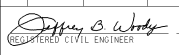
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NO SCALE

ES-7B

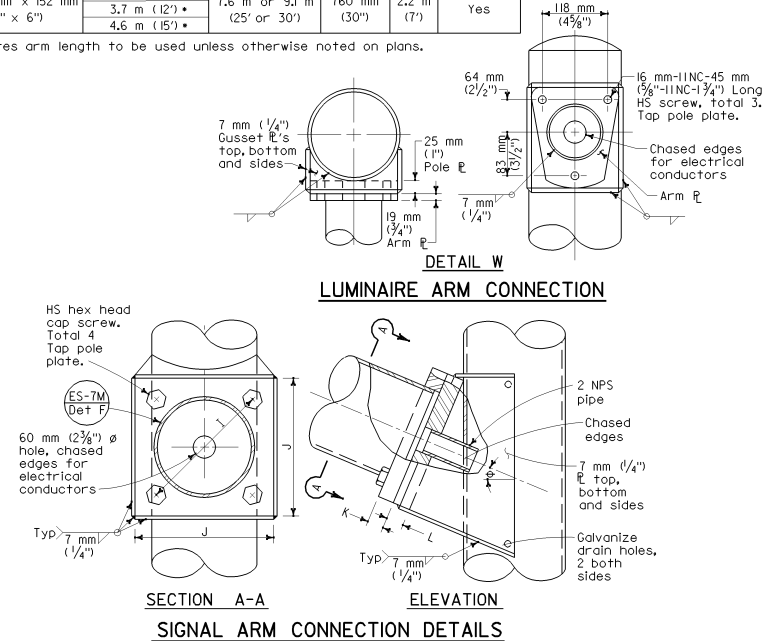
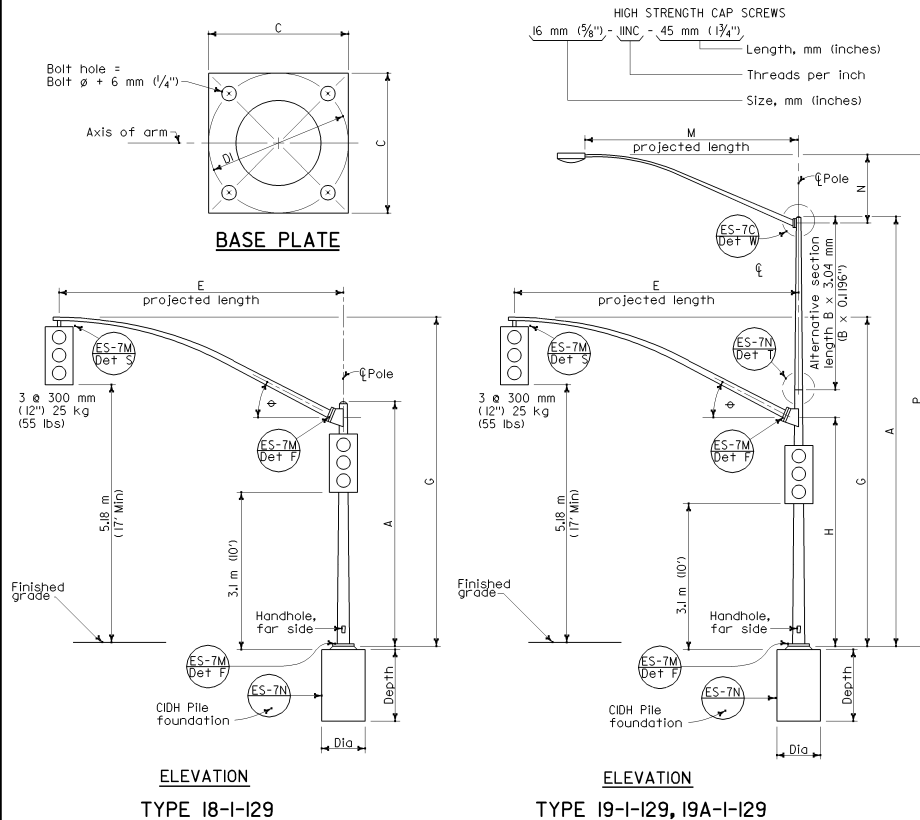
SIGNAL ARM DATA									
E Projected Height	G Mounting Height	H	Min OD at Pole	Thickness	I Bolt Circle	HS Cap Screws	J Plate Size	K Arm ℓ Thickness	L Pole ℓ Thickness
4.6 m (15')	6.8 m (22.3') \pm	4.9 m (16')	178 mm (7")	3.04 mm (0.1196")	305 mm (12")	32 mm-7NC-76 mm (1 1/4"-7NC-3")	305 mm (12")	32 mm (1 1/4")	38 mm (1 1/2")
6.1 m (20')	6.6 m (21.7') \pm		181 mm (7 1/8")						
7.6 m (25')	6.9 m (22.6') \pm		186 mm (7 3/8")						
9.1 m (30')	7.0 m (23.0') \pm		203 mm (8")						

LUMINAIRE ARM DATA					
M Projected Length	N Rise	Min OD at Pole	Thickness	P Mounting Height	
1.8 m (6')	610 mm (24") \pm	83 mm (3 1/4")		9.1 m (30') Pole	10.7 m (35') Pole
2.4 m (8')	760 mm (30") \pm	89 mm (3 1/2")		9.6 m (31.5') \pm	11.1 m (36.4') \pm
3.1 m (10')	990 mm (39") \pm	98 mm (3 7/8")		9.8 m (32.2') \pm	11.3 m (37.1') \pm
3.7 m (12')	1290 mm (51") \pm			10.0 m (32.8') \pm	11.5 m (37.7') \pm
4.6 m (15')	1450 mm (57") \pm	108 mm (4 1/4")	3.04 mm (0.120")	10.3 m (33.8') \pm	11.8 m (38.7') \pm
				10.5 m (34.4') \pm	12.0 m (39.4') \pm

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
 REGISTERED CIVIL ENGINEER No. C41260 Exp. 3-31-03 STATE OF CALIFORNIA					
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Pole Type	Load Case	Wind Velocity	POLE DATA							BASE PLATE DATA				Luminaire Arm (See Luminaire Arm Data)	Signal Arm (See Signal Arm Data)	CIDH PILE FOUNDATION		
			A Height	Min OD		Thickness	Alternative Section			C	DI Bolt Circle	Thickness	Anchor Bolts Size			Diameter	Depth	Reinforce
				Base	Top		B Length	Bottom	Top									
18-I-129	I	129 km/h (80 mph)	5.2 m (17')	273 mm	214 mm (8 5/8")	4.55 mm	None	None	None	457 mm	445 mm	32 mm	38 mm ϕ x 1067 mm x 152 mm	None	7.6 m or 9.1 m (25' or 30')	760 mm (30")	2.2 m (7')	Yes
19-I-129			9.1 m (30')	168 mm	168 mm (6 5/8")	(0.1793")	3.0 m (10')	203 mm	168 mm (6 5/8")	(18")	(17 1/2")	(1 1/4")	3.7 m (12') •					
19A-I-129			10.7 m (35')	151 mm	151 mm (5 7/8")		4.6 m (15')	(8")	151 mm (5 7/8")				4.6 m (15') •					

* Indicates arm length to be used unless otherwise noted on plans.



STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

SIGNAL AND LIGHTING STANDARDS

CASE 1 ARM LOADING

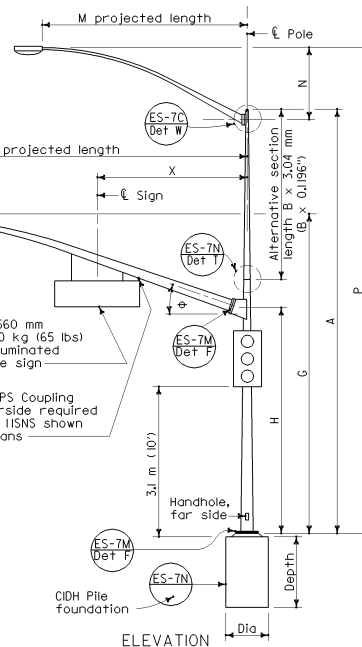
WIND VELOCITY=129 km/h (80 mph)


ARM LENGTHS 4.6 m-9.1 m (15'-30')

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NO SCALE

ES-7C



ELEVATION 

TYPE 17-2-129, 19-2-129,
17A-2-129, 19A-2-129

HIGH STRENGTH CAP SCREWS
 { 16 mm (5/8") } - { UNC } - { 45 mm (1 3/4") }
 Length, mm (inches)
 Threads per inch
 Size, mm (inches)

* Indicates arm length to be used unless otherwise noted on plans.

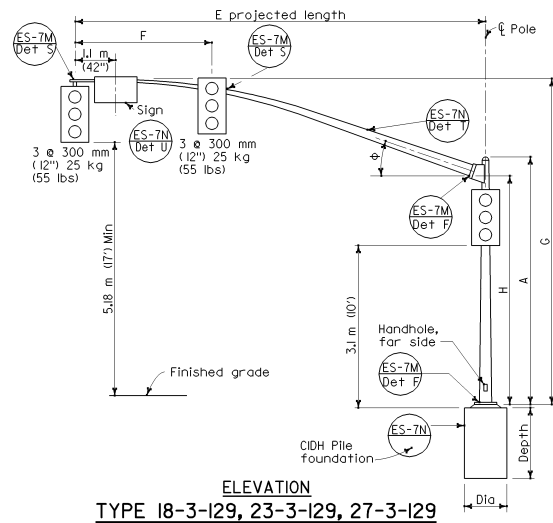
SIGNAL ARM DATA										
E Projected Height	G Mounting Height	H	Min OD at Pole	Thickness	I Bolt Circle	HS Cap Screws	J Plate Size	K Arm L Thickness	L Pole L Thickness	Ø X Max
4.6 mm (18")	6.8 mm (22.3") ±	4.9 mm (16")	168 mm (6 5/8")	4.55 mm (0.1793")	305 mm (12")	32 mm-7NC-76 mm (1 1/4"-7NC-3")	305 mm (12")	32 mm (1 1/4")	38 mm (1 1/2")	23* (10.6")
6.1 mm (20")	6.6 mm (21.7") ±		168 mm (6 5/8")							
7.6 mm (25")	6.9 mm (22.6") ±		186 mm (7 3/8")							
9.1 mm (30")	7.0 mm (23.0") ±		203 mm (8")							

rise noted on plans.

STATE OF CALIFORNIA
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SIGNAL AND LIGHTING STANDARDS
CASE 2 ARM LOADING
WIND VELOCITY=129 km/h (80 mph)
ARM LENGTHS 4.6 m-9.1 m (15'-30')

ES-7D



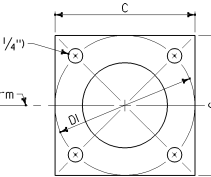
ELEVATION
TYPE 18-3-I29, 23-3-I29, 27-3-I29

LUMINAIRE ARM DATA				P Mounting Height	
M Projected Length	N Rise	Min OD at Pole	Thickness	9.1 m (30') Pole	10.7 m (35') Pole
1.8 m (6')	610 mm (24") ±	83 mm (3 1/4")	3.04 mm (0.1196")	9.6 m (31.5') ±	11.1 m (36.4') ±
2.4 m (8')	760 mm (30") ±	89 mm (3 1/2")		9.8 m (32.2') ±	11.3 m (37.1') ±
3.1 m (10')	990 mm (39") ±	98 mm (3 7/8")		10.0 m (32.8') ±	11.5 m (37.7') ±
3.7 m (12')	1290 mm (51") ±	108 mm (4 1/4")		10.3 m (33.8') ±	11.9 m (38.7') ±
4.6 m (15')	1450 mm (57") ±	108 mm (4 1/4")		10.5 m (34.4') ±	12.0 m (39.4') ±

Bolt hole =
Bolt ϕ + 6 mm (1/4")

Axis of arm

BASE PLATE



HS hex head cap screw,
Total 4
Top pole plate
60 mm (2 3/4") ϕ hole, chased edges for electrical conductors
Typ 7 mm (1/4")

SECTION A-A

ELEVATION

SIGNAL ARM CONNECTION DETAILS

16 mm (5/8") - UNC - 45 mm (1 3/4")
Length, mm (inches)
Threads per inch
Size, mm (inches)

Pole Type	Load Case	Wind Velocity	POLE DATA						BASE PLATE DATA				Luminaire Arm (See Luminaire Arm Data)	Signal Arm (See Signal Arm Data)	CIDH PILE FOUNDATION			
			A Height	Min OD		Thick-ness	Alternative Section			C	DI Bolt Circle	Thick-ness			Anchor Bolts Size	Dia	Depth	Rein-force
				Base	Top		B Length	Bottom	Top									
17-3-I29	3	129 km/h (80 mph)	9.1 m (30')	168 mm (6 5/8")	4.55 mm (0.179")	3.1 m (10')	203 mm (8")	203 mm (8")	457 mm (18")	445 mm (17 1/2")	38 mm (1 1/2")	51 mm ϕ x 1067 mm x 152 mm (2" ϕ x 42" x 6")	3.7 m (12') •	6.1 m (20')	914 mm (36")	2.7 m (7')	Yes	
18-3-I29			273 mm (10 3/4")	214 mm (8 3/4")	None	None	None	None										
19-3-I29			9.1 m (30')	168 mm (6 5/8")	6.07 mm (0.239")	3.1 m (10')	203 mm (8")	203 mm (8")					3.7 m (12') •	9.1 m (30')*				
19A-3-I29			10.7 m (35')	151 mm (5 7/8")		4.6 m (15') (8")	151 mm (5 7/8")	151 mm (5 7/8")					4.6 m (15') •	None				
23-3-I29			5.2 m (17')	229 mm (9")		None	None	None					None	None				
24-3-I29			9.1 m (30')	203 mm (8")		3.1 m (10')	184 mm (7 1/4")	184 mm (7 1/4")					3.7 m (12') •	10.7 m (35')				
24A-3-I29			10.7 m (35')	186 mm (7 3/8")		4.6 m (15') (9 3/4")	168 mm (6 5/8")	168 mm (6 5/8")					4.6 m (15') •	None				
26-3-I29			9.1 m (30')	203 mm (8")		3.1 m (10')	203 mm (8")	203 mm (8")					3.7 m (12') •	13.7 m (40')*				
26A-3-I29			10.7 m (35')	186 mm (7 3/8")		4.6 m (15')	186 mm (7 3/8")	186 mm (7 3/8")					4.6 m (15') •	None				
27-3-I29			5.2 m (17')	248 mm (9 3/4")		None	None	None					None	None				

*Indicates arm length to be used unless otherwise noted on plans.

SIGNAL ARM DATA											
E Projected Height	F Min Spacing	G Mounting Height	H	Min OD at Pole	Thickness	I Bolt Circle	HS Cap Screws	J Plate Size	K Arm ϕ Thickness	L Pole ϕ Thickness	M Pole Height
4.6 m (15') 6.1 m (20') 7.6 m (25') 9.1 m (30')	2.5 m (8')	6.8 m (22.3') \pm 6.6 m (21.7') \pm 6.9 m (22.6') \pm	4.9 m (16')	168 mm (6 5/8") 186 mm (7 3/8") 203 mm (8") 222 mm (8 3/4") 238 mm (9 3/8") 256 mm (10 1/8")	4.55 mm (0.179") 6.07 mm (0.239")	305 mm (12") 330 mm (13")	32 mm-7NC-76 mm (1 1/4"-7NC-3")	305 mm (12") 305 mm (12")	32 mm (1 1/4") 38 mm (1 1/2")	38 mm (1 1/2") 45 mm (1 3/4")	23 21 15
10.7 m (35') 12.2 m (40') 13.7 m (45')	4.3 m (14') 4.6 m (15')	7.0 m (23.0') \pm 7.2 m (23.6') \pm									

SIGNAL AND LIGHTING STANDARDS
CASE 3 ARM LOADING
WIND VELOCITY=129 km/h (80 mph)
ARM LENGTHS 4.6 m-13.7 m (15'-45')

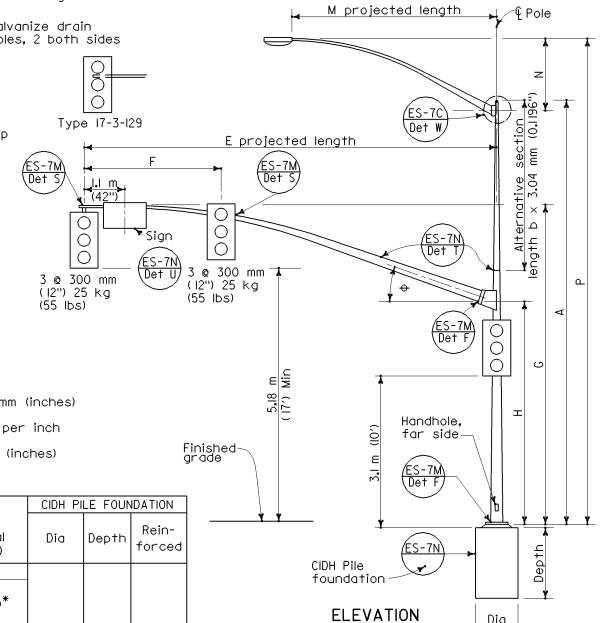
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NO SCALE

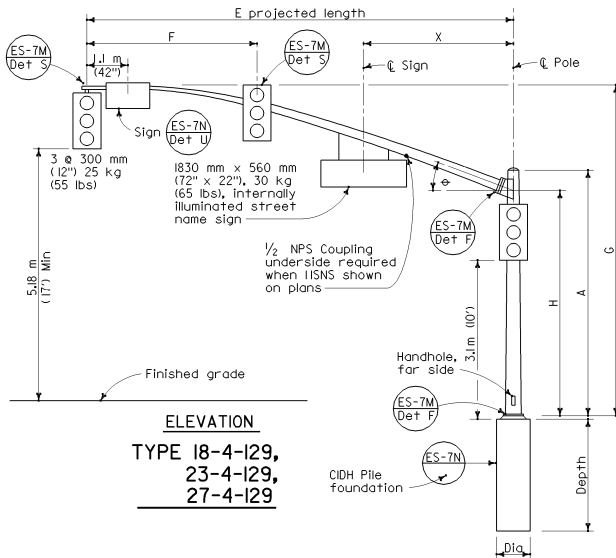
ES-7E

THIS STANDARD PLAN ES-7E INCLUDES CHANGES THAT WERE INCORPORATED IN REVISED STANDARD PLAN RSP ES-7E, DATED OCTOBER 26, 2000, AND ISSUED AS A PART OF ERRATUM NO. 99-1 FOR THE 1999 METRIC STANDARD PLANS.

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
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<p>Jeffrey B. Woody REGISTERED PROFESSIONAL ENGINEER No. 341260 Exp. 3-31-03 CIVIL STATE OF CALIFORNIA</p>					



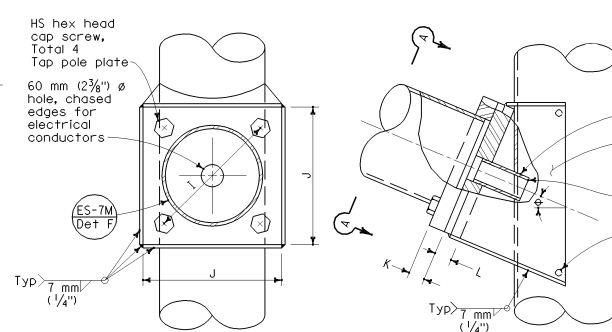
ELEVATION
TYPE 17-3-I29, 24A-3-I29, 19-3-I29,
26-3-I29, 19A-3-I29,
26A-3-I29, 24-3-I29



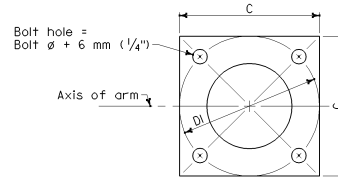
ELEVATION
TYPE 18-4-I29,
23-4-I29,
27-4-I29

LUMINAIRE ARM DATA				
M Projected Length	N Rise	Min OD at Pole	Thickness	P Mounting Height
1.8 m (6')	610 mm (24") ±	83 mm (3 1/4")	3.04 mm (0.196")	9.1 m (30') Pole
2.4 m (8')	760 mm (30") ±	89 mm (3 1/2")		10.7 m (35') Pole
3.1 m (10')	990 mm (39") ±	98 mm (3 7/8")		11.1 m (36.4') ±
3.7 m (12')	1290 mm (51") ±	108 mm (4 1/4")		11.3 m (37.1') ±
4.6 m (15')	1450 mm (57") ±	108 mm (4 1/4")		11.5 m (37.7') ±
				10.0 m (32.8') ±
				10.3 m (33.8') ±
				11.9 m (38.7') ±
				10.5 m (34.4') ±
				12.0 m (39.4') ±

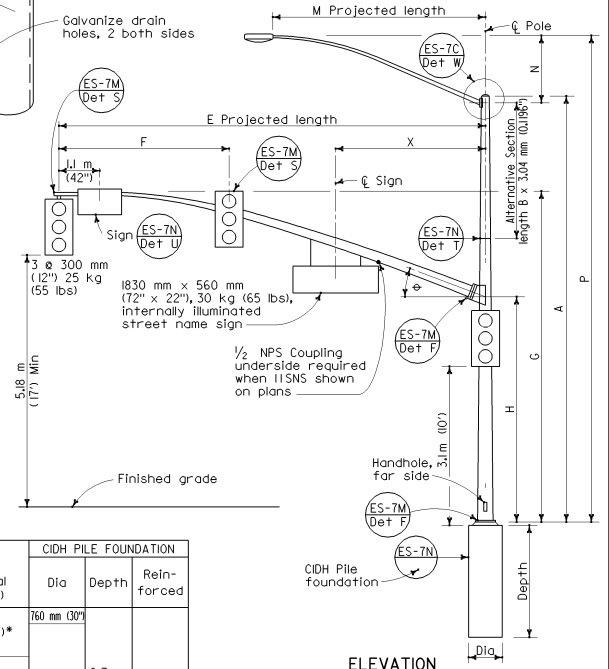
HIGH STRENGTH CAP SCREWS
16 mm (5/8") - 11NC - 45 mm (1 3/4")
Length, mm (inches)
Threads per inch
Size, mm (inches)



SECTION A-A
SIGNAL ARM CONNECTION DETAILS



BASE PLATE



ELEVATION
TYPE 19-4-I29, 24A-4-I29, 19A-4-I29,
26-4-I29, 24-4-I29 and 126A-4-I29

*Indicates arm length to be used unless otherwise noted on plans.

Pole Type	Load Case	Wind Velocity	POLE DATA						BASE PLATE DATA				Luminaire Arm (See Luminaire Arm Data)	Signal Arm (See Signal Arm Data)	CIDH PILE FOUNDATION														
			A Height	Min OD		Thick-ness	Alternative Section			C	DI Bolt Circle	Thick-ness			Anchor Bolts Size	Dia	Depth	Rein-force											
				Base	Top		B Length	Bottom	Top																				
18-4-I29	4	129 km/h (80 mph)	5.2 m (17')	305 mm (12")	305 mm (12")	6.07 mm (0.239")	None	238 mm (9 3/8")	203 mm (8")	457 mm (18")	445 mm (17 1/2")	38 mm (1 1/2")	51 mm ø x 1067 mm x 152 mm (2" ø x 42" x 6")	None	9.1 m (30')*	760 mm (30")	2.7 m (9')	Yes											
19-4-I29			9.1 m (30')				203 mm (8")												3.1 m (10')										
19A-4-I29			10.7 m (35')				186 mm (7 3/8")												4.6 m (15')										
23-4-I29			5.2 m (17')	229 mm (9")	None	238 mm (9 3/8")	203 mm (8")	457 mm (18")	445 mm (17 1/2")						38 mm (1 1/2")				51 mm ø x 1067 mm x 152 mm (2" ø x 42" x 6")	None	10.7 m (35')								
24-4-I29			9.1 m (30')	203 mm (8")	3.1 m (10')																								
24A-4-I29			10.7 m (35')	186 mm (7 3/8")	4.6 m (15')																								
26-4-I29			9.1 m (30')	308 mm (12 1/8")	308 mm (12 1/8")	7.94 mm (0.3125")	203 mm (8")														238 mm (9 3/8")	203 mm (8")	457 mm (18")	445 mm (17 1/2")	38 mm (1 1/2")	51 mm ø x 1067 mm x 152 mm (2" ø x 42" x 6")	None	13.7 m (45')*	
26A-4-I29			10.7 m (35')				186 mm (7 3/8")																						4.6 m (15')
27-4-I29			5.2 m (17')				248 mm (9 3/4")																						None

SIGNAL ARM DATA										
E Projected Height	F Min Spacing	G Mounting Height	H	Min OD at Pole	Thickness	I Bolt Circle	HS Cap Screws	J Plate Size	K Arm Thickness	L Pole Thickness
7.6 m (25')	3.1 m (10')	6.9 m (22.6') ±	4.9 m (16')	168 mm (7 1/8")	6.07 mm (0.239")	305 mm (12")	32 mm-7NC-76 mm (1 1/4"-7NC-3")	305 mm (12")	32 mm (1 1/4")	38 mm (1 1/2")
9.1 m (30')	3.7 m (12')	7.0 m (23') ±		203 mm (8")		330 mm (13")		330 mm (13")	38 mm (1 1/2")	45 mm (1 3/4")
10.7 m (35')	4.3 m (14')	7.2 m (23.5') ±		222 mm (8 11/16")						
12.2 m (40')	4.6 m (15')			238 mm (9 3/8")						
13.7 m (45')				256 mm (10 1/8")						

SIGNAL AND LIGHTING STANDARDS

CASE 4 ARM LOADING

WIND VELOCITY=129 km/h (80 mph)

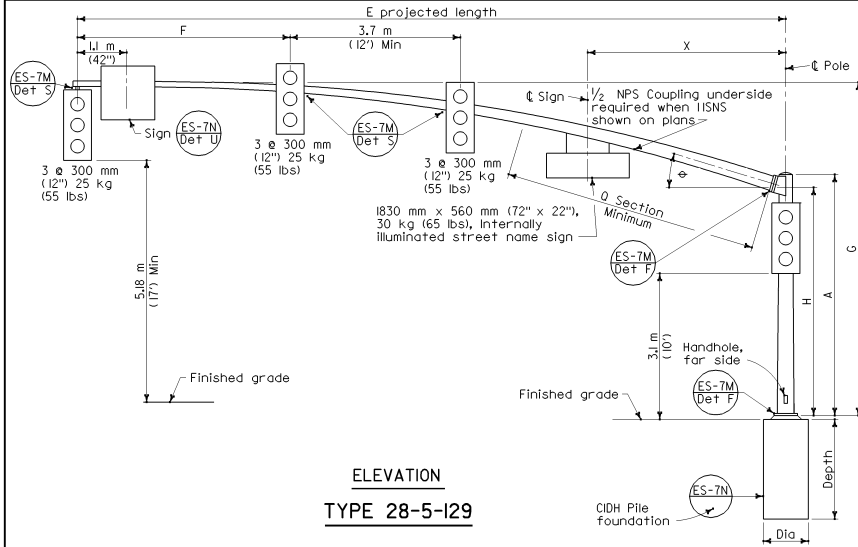
ARM LENGTHS 7.6 m-13.7 m (25'-45')

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NO SCALE

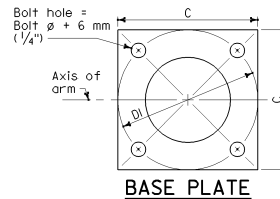
ES-7F

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET TOTAL SHEETS
Jeffrey S. Woody REGISTERED CIVIL ENGINEER No. C41260 Exp. 3-31-03 STATE OF CALIFORNIA				
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ELEVATION
TYPE 28-5-129

LUMINAIRE ARM DATA				
M Projected Length	N Rise	Min OD at Pole	Thick- ness	P Mounting Height
1.8 m (6')	610 mm (24\") ±	83 mm (3 1/4\")	3.04 mm (0.1196\")	9.1 m (30') Pole
2.4 m (8')	760 mm (30\") ±	89 mm (3 1/2\")		10.7 m (35') Pole
3.1 m (10')	990 mm (39\") ±	98 mm (3 7/8\")		
3.7 m (12')	1290 mm (51\") ±			
4.6 m (15')	1450 mm (57\") ±	108 mm (4 1/4\")		



BASE PLATE

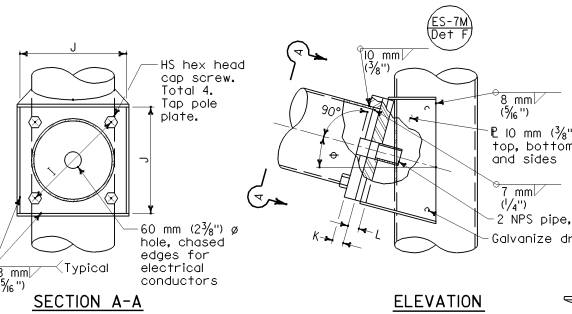
Pole Type	Load Case	Wind Velocity	POLE DATA						BASE PLATE DATA						Luminaire Arm (See Luminaire Arm Data)	Signal Arm (See Signal Arm Data)	CIDH PILE FOUNDATION		
			A Height	Min OD		Thick-ness	Alternative Section			C	DI Bolt Circle	Thick-ness	Anchor Bolts Size	Dia			Depth	Rein-force	
				Base	Top		B Length	Bottom	Top										
28-5-129	5	129 km/h (80 mph)	5.2 m (17')	356 mm (14")	297 mm (11 5/8")	7.94 mm (0.3125")	None	286 mm	251 mm (9 7/8")	533 mm (21")	533 mm (21")	45 mm (1 3/4")	51 mm ø x 1067 mm x 152 mm (2" ø x 42" x 6")	None	15.2 m (50') or 16.8 m (55') 15.2 m (50')	914 mm (36")	2.8 m (9.2')	Yes	
29-5-129			9.1 m (30')	251 mm (9 7/8")		3.1 m (10')								4.6 m					
29A-5-129			10.7 m (35')	233 mm (9 3/8")		4.6 m (15')	(11 1/4")	233 mm (9 3/8")	559 mm (22")	559 mm (22")									

* Indicates arm length to be used unless otherwise noted on plans.

SIGNAL ARM DATA														
E Projected Height	F Min Spacing	G Mounting Height	H	Min OD at Pole	Thickness	I Bolt Circle	HS Cap Screws	J Plate Size	K Arm Thickness	L Pole Thickness	O Section		X Max	
											Length	Thick- ness		
15.2 m (50') 16.8 m (55')	4.6 m (15')	7.0 m (23.0') ±	4.9 m (16')	291 mm (11 ¹ / ₈ ") 305 mm (12")	4.55 mm (0.1793")	4.00 mm (15 ³ / ₄ ")	38 mm-6NC-83 mm (1 ¹ / ₂ "-6NC-3 ³ / ₄ ")	381 mm (15")	45 mm (1 ³ / ₄ ")	45 mm (1 ³ / ₄ ")	15°	5.5 m (18') 7.0 m (23') (0.239")	6.1 mm (14')	4.3 (14')

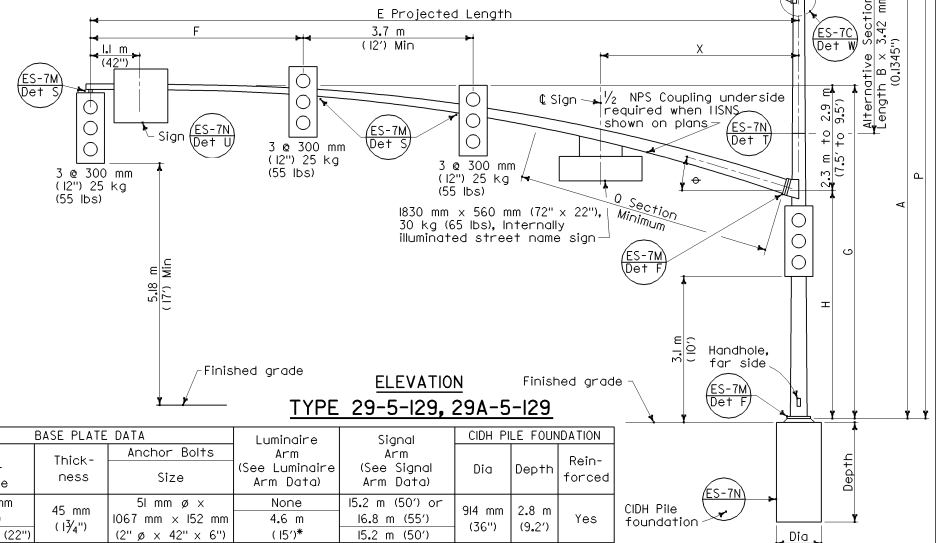
HIGH STRENGTH CAP SCREWS
16 mm (5/8") - UNC - 45 mm (1 3/4")

Length, mm (inches)
Threads per inch
Size, mm (inches)



SECTION A-A

SIGNAL ARM CONNECTION DETAILS



ELEVATION
TYPE 29-5-129, 29A-5-129

DIST	COUNTY	ROUTE	KILOMETER TOTAL PROJECT	POST NO.	SHEET TOTAL SHEETS

July 1, 2002

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STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

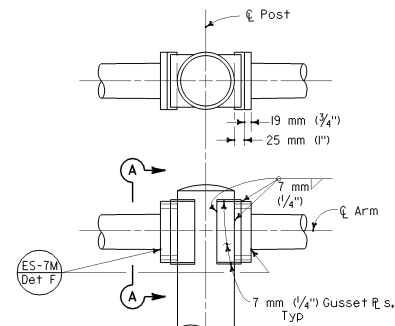
SIGNAL AND LIGHTING STANDARDS
CASE 5 ARM LOADING
WIND VELOCITY=129 km/h (80 MPH)
ARM LENGTHS 15.2 m-16.8 m (50'-55')

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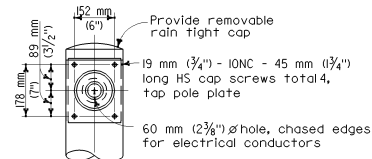
NO SCALE

ES-7G

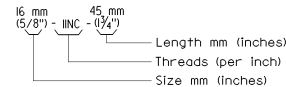




SECTION A-A



HIGH STRENGTH CAP SCREWS



NOTES:

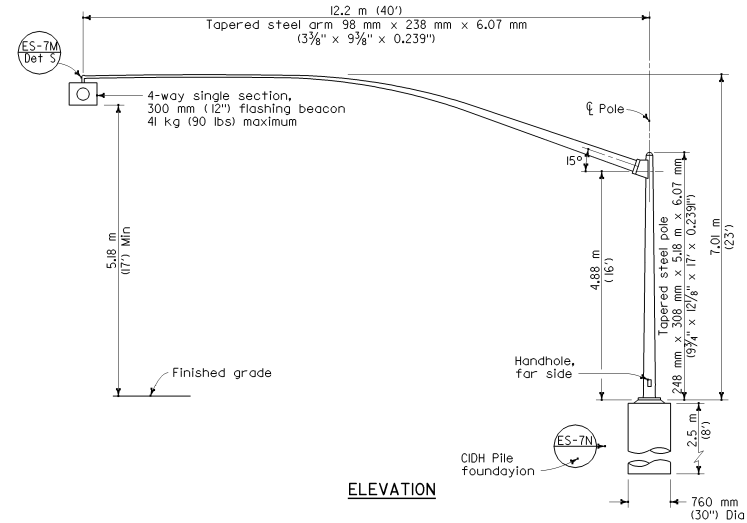
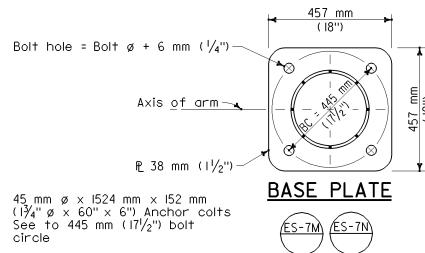
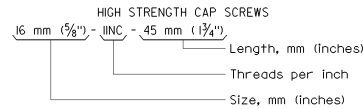
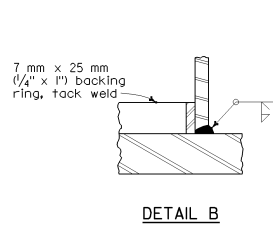
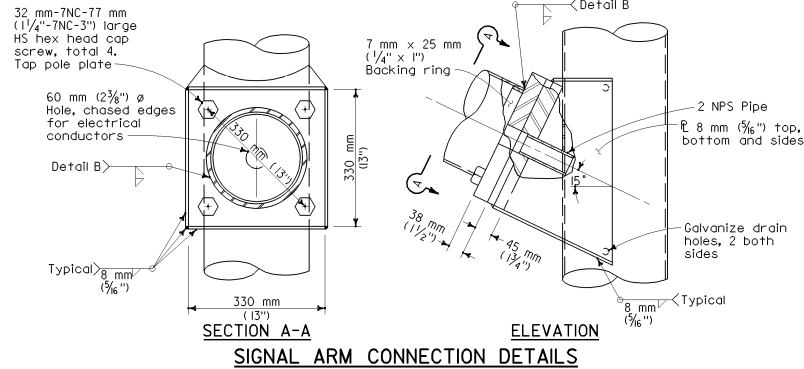
1. Round tapered steel tube 4.55 mm (0.1793") with maximum taper of 11.67 mm/m (0.14-inch per foot) and 140 mm (5 1/2") OD minimum at pole.
2. In lieu of the torque requirements for HS bolts, cap screws shall be tightened by the turn-of-nut method, 1/3 turn from snug tight condition. No washer will be required.
3. For arm lengths and signs or signals required each side of ϕ pole, see Signal plans.
4. Mast arm signal to be MAS mounted on pipe tenon Detail S on Standard Plan ES-7M.
5. Sign area shall not exceed 1.36 m² (14.6 square feet) for each sign.
6. If all 3 signs are placed on one side of pole one sign must be placed adjacent to pole.

STATE OF CALIFORNIA
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SIGNAL AND SIGN STANDARDS
TYPE 33
LEFT TURN

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NO SCALE

ES-71



NOTE:

For details not shown, see
Standard Plans ES-7M and ES-7N.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
SIGNAL AND LIGHTING STANDARDS
TYPE 40-0-129

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NO SCALE

ES-7J



MAST ARM CONNECTION DETAILS

NOTE

Tighten front hex nuts first,
then tighten back hex nuts.

NOTE

For lighting details not shown,
see Note 5 on Standard Plan
ES-7K. Mounting to channel
shown, mounting to angle similar.

VIEW D-D

POLE TOP DETAIL

PLAN

ELEVATION (11/4")
BASE PLATE AND
ANCHORAGE DETAILS

DETAIL A

ALTERNATIVE
DETAIL A

For pole-base plate only.

INCANDESCENT LIGHTING FIXTURE
TYPES 9A AND 9B

See Note 4 on Standard Plan ES-7K.

FLUORESCENT LIGHTING FIXTURE
TYPE 9 FRAME

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**SIGNAL, LIGHTING AND
ELECTRICAL SYSTEMS
CANTILEVER FLASHING BEACON
TYPES 9, 9A AND 9B**

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NO SCALE

ES-7L

DIST	COUNTY	ROUTE	KILOMETER POST	POST PROJECT	SHEET NO.	TOTAL SHEET

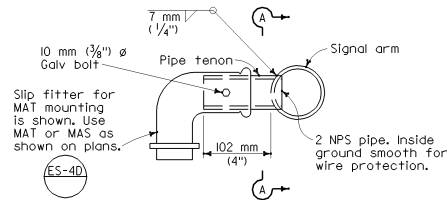
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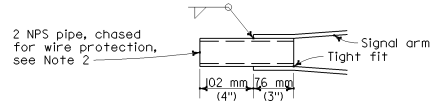
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STATE OF CALIFORNIA

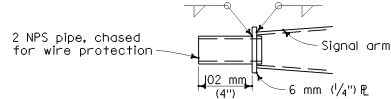


DETAIL S-SIDE TENON

PIPE TENONS

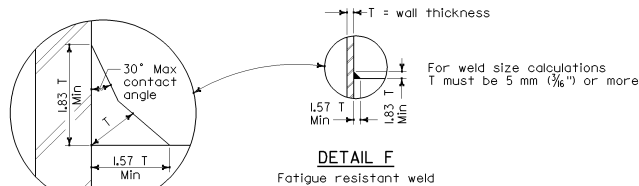


DETAIL TS-TIP TENON



DETAIL TL-TIP TENON

This detail supersedes Detail S when so designated

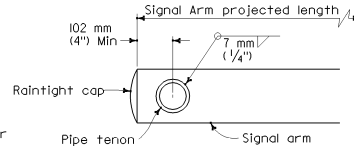


DETAIL F

Fatigue resistant weld

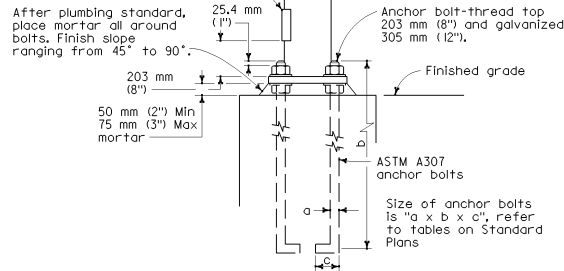
	Weld Size	Wall
Pole or Arm	7	3.04 mm (0.1196")
	8	4.55 mm (0.1793")
	10	6.07 mm (0.2391")
See Detail F	11	7.94 mm (0.3125")
	4	3.04 mm (0.1196")
	5	4.55 mm (0.1793")
	7	6.07 mm (0.2391")
	8	7.94 mm (0.3125")

ELEVATION A

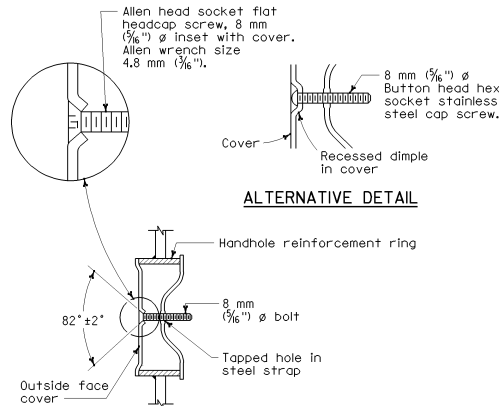


SECTION A-A

102 mm x 165 mm (4" x 6 1/2") handhole reinforced with ring welded to outside of pole. See Note 4, 3 mm (1/8") cover plate.



HANDHOLE AND ANCHORAGE DETAILS



ALTERNATIVE DETAIL

TAMPER RESISTANT
HANDHOLE COVER

IDENTIFICATION NUMBER

Attach a stamped metal tag with each pole's identification number to show above handhole. 7 mm (1/4") high number minimum. A similar tag shall be attached to the top of the signal mast arm near the pole plate.

Sample Identification Number:

19A - 3 - 129 km/h (80 mph) - 91 m (30') - 99 - F

Use SL for special load case.

Type
Load Case
Design Wind Velocity
Signal Arm Length, Maximum
Standard Plans Year
Only for Poles with fatigue resistant welds

GENERAL NOTES:

SPECIFICATIONS

Design: AASHTO specifications for the design and construction of structural supports for highway signs, luminaires and traffic signals, dated 1994.

LOADING

Wind Loadings: 129 km/h (80 mph) AASHTO.

UNIT STRESSES

Structural Steel: $f_y = 331 \text{ MPa}$ (48,000 psi) tapered steel tube (pole).
 $f_y = 248 \text{ MPa}$ (36,000 psi) unless otherwise noted.

Construction: Standard Specifications and the Special Provisions.

NOTES

- 4-ASTM A-307 anchor bolts are required for each pole. Provide a hex nut, leveling nut and 2 washers for each bolt.
- Luminaire arms shall be round, tapered steel tubes, taper of 11.45 mm/m to 11.66 mm/m (0.375 to 0.400 inch per foot) with an end section 60 mm (2 3/8") OD for mounting hardware. Extensions of 2 NPS pipe and 178 mm (7") long may be used at the option of the manufacturer. When low pressure sodium luminaires are required, the extension shall be 381 mm (15").
- Signal arms shall be round, tapered steel tubes, maximum taper 11.66 mm/m (0.40 inch per foot).
- Handhole reinforcement ring shall be 6 mm x 51 mm (1/4" x 2") for 3.04 mm to 6.07 mm (0.1196" to 0.2391") poles, 10 mm x 51 mm (3/8" x 2") for 7.94 mm (0.3125") poles.
- Handholes for lighting standards shall be located on the downstream side of the pole unless otherwise noted on the plans.
- Detail F, fatigue resistant weld, is required at signal arm plate on pole base plate.
- In lieu of the torque requirements for HS bolts, cap screws shall be tightened by the turn-of-nut method 1/3 turn from a snug tight condition. No washer will be required.
- During pole erection, the post shall be raked as necessary with the use of leveling nuts to provide a plumb pole axis.
- When Project Plans show a lesser number of signs and signals, the Project Plans shall prevail.
- Outside diameter, wall thickness, and corresponding section properties at the base of traffic signal poles and arms as shown in the Standard Plans are minimum. Unless otherwise specified, alternative sections require approval by the Engineer.


STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**SIGNAL AND LIGHTING STANDARDS
DETAILS NO. 1**

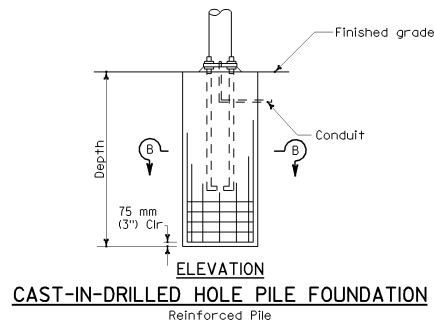
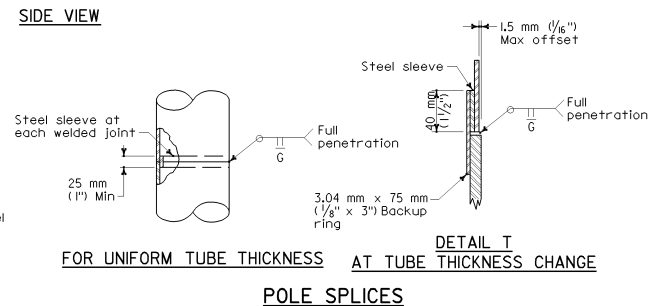
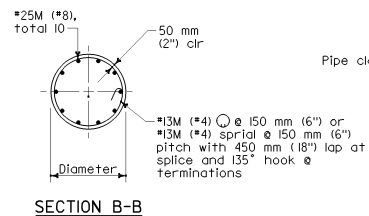
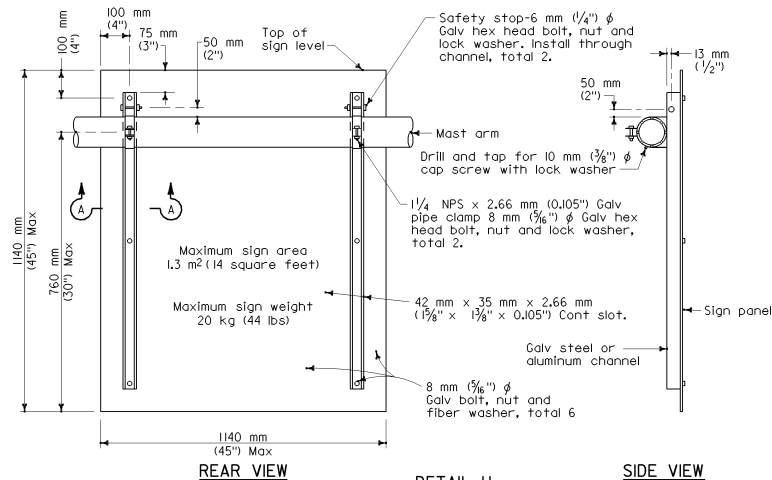
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NO SCALE

ES-7M

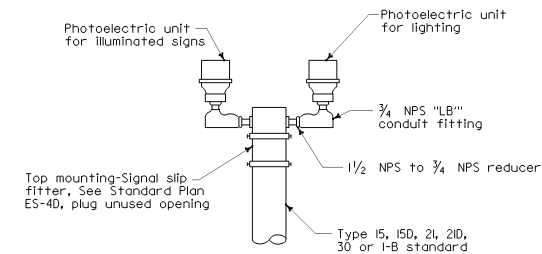
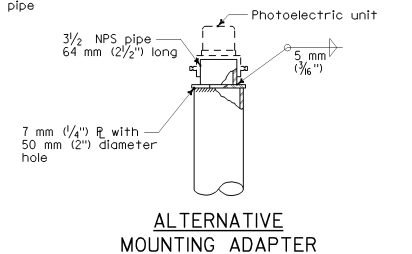
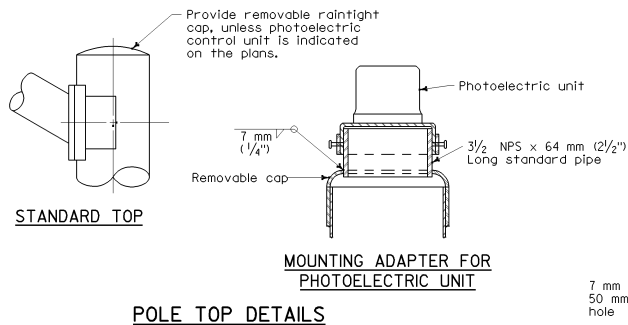
DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS


 REGISTERED CIVIL ENGINEER
 July 1, 2002
 PLANS APPROVAL DATE
 No. C41260
 Exp. 3-31-03
 JEFFREY B. WOODY
 STATE OF CALIFORNIA
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Poles to be Installed on existing foundations

Bolt circles and anchor bolt sizes have been revised. The contractor shall verify dependent dimensions before fabricating poles to be installed on existing foundations.



SIGNAL AND LIGHTING STANDARDS DETAIL NO. 2

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NO SCALE

ES-7N

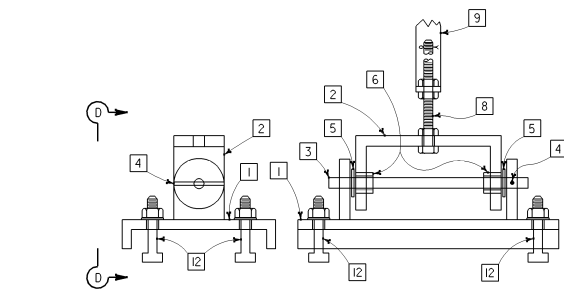
DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

July 1, 2002
PLANS APPROVAL DATE

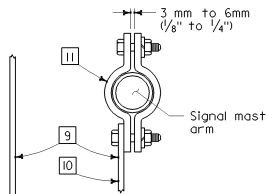
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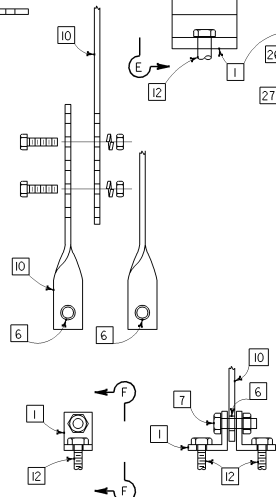
REGISTERED CIVIL ENGINEER
Jeffrey S. Woody
No. C41260
Exp. 3-31-03
STATE OF CALIFORNIA



VIEW D-D

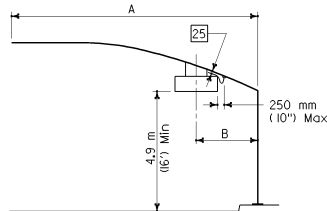


VIEW E-E

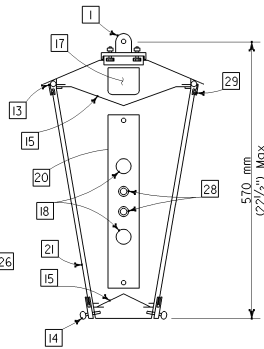


VIEW F-F

MOUNTING ASSEMBLY OPTIONS

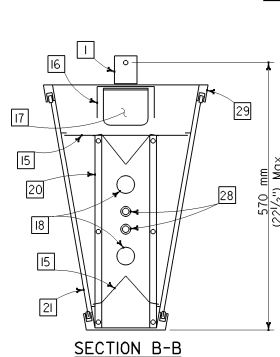


SIGN PLACEMENT



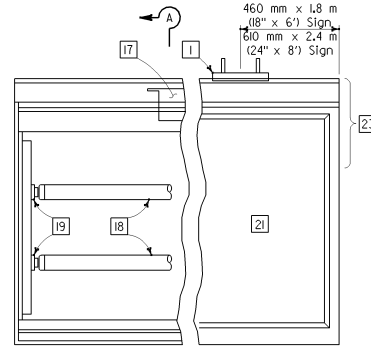
SECTION A-A

TYPE A SIGN



SECTION B-B

TYPE B SIGN



SIGN PLACEMENT

SIGN PLACEMENT	
A	B
1.8-m (6') Sign	2.4-m (8') Sign
6.1 m (20')	2.4 m (7.8')
7.6 m (25')	2.8 m (9.1')
9.1 m (30')	2.9 m (9.5')
10.7 m (35')	3.2 m (10.5')
12.2 m (40')	3.8 m (12.5')
13.7 m (45')	3.8 m (12.5')
15.2 m (50')	3.8 m (12.5')
16.8 m (55')	3.8 m (12.5')

NOTES

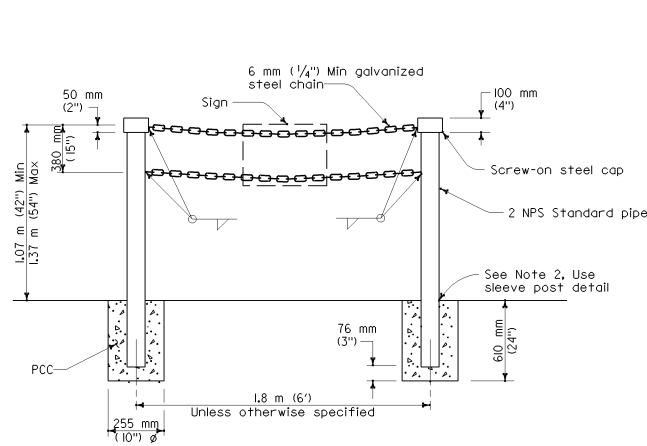
- [1] Lower mounting assembly, with gasket.
- [2] Upper mounting assembly.
- [3] Rod, 13 mm (1/2") ϕ , stainless steel.
- [4] Looking pin, steel.
- [5] Flat washer, stainless steel.
- [6] Bushing, bronze.
- [7] Bolt, 6 mm (1/4") ϕ stainless steel, with self-locking nut.
- [8] Bolt, 13 mm (1/2") ϕ stainless steel, with three nuts, and cotter key. Length as required for proper mounting of sign.
- [9] Bracket, 6 mm x 40 mm (1/4" x 1 1/2") minimum length variable.
- [10] Bracket, 2-piece adjustable, 6 mm x 40 mm (1/4" x 1 1/2") minimum. Two 13 mm (1/2") ϕ hexagon head bolts with nuts and lockwashers.
- [11] Clamp, 2-piece, shaped to fit mast arm. 6 mm x 40 mm (1/4" x 1 1/2") minimum. Two 13 mm (1/2") ϕ hexagon head bolts with lockwashers.
- [12] Mounting bolt, 6 mm (1/4") ϕ minimum, with nut and lockwasher, or self-locking nut and cotter key.
- [13] Continuous hinge.
- [14] Thumb screw, 16 mm (5/8") ϕ , minimum two per side on 1220 mm (48") centers.
- [15] Reflector, 1 mm (0.040") minimum thickness.
- [16] Aluminum stiffener.
- [17] Fluorescent ballast (2 required).
- [18] Lamp, F72T12CW for 1.8 m (6') sign F96T12CW for 2.4 m (8') sign.
- [19] Lamp holder.
- [20] Lamp holder turret.
- [21] Sign panel, 380 mm (15") minimum height. Message is shown elsewhere.
- [22] Cord, 16/3 type SJT. Continuous from sign terminal block to signal head mounting terminal compartment. Form a 300 mm (12") drip loop between sign and mast arm.
- [23] Cord connector, 90° angle at sign. Locate in upper 1/3 of sign. Straight at mast arm. Drill and tap bottom of mast arm.
- [24] Adjust fixture level and no lower than center of signal arm connection.
- [25] Approximate clearance, 25 mm (1").
- [26] 6 mm (1/4") Fillet weld, 32 mm (1 1/4") long.
- [27] Sign frame.
- [28] Fuse holder and fuse.
- [29] Close cell neoprene gasket (continuous).

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**SIGN ILLUMINATION
INTERNALLY ILLUMINATED
STREET NAME SIGN**

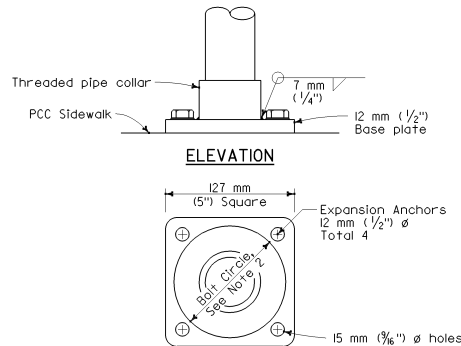
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NO SCALE

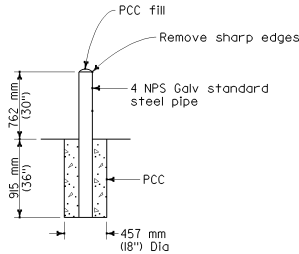
ES-70



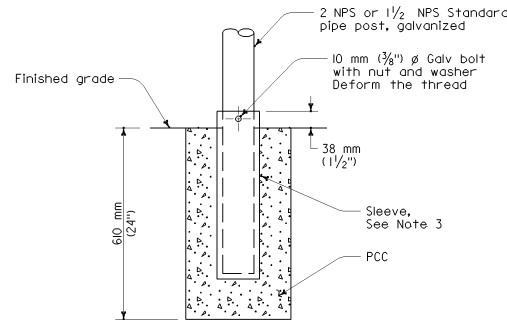
TYPE II



POST ANCHORAGE DETAIL

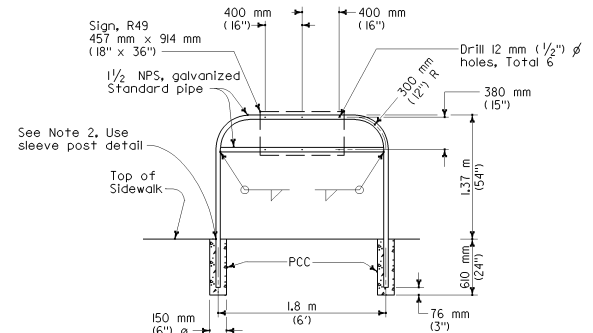


GUARD POST



SLEEVE POST DETAIL

Use unless otherwise specified or shown on plans



TYPE I

NOTES

1. Pipe post to be set 460 mm (18") back from face of curb unless otherwise specified.
2. Where barricade posts are installed in existing concrete sidewalk, the post may be anchored to the sidewalk as shown in the "Post Anchorage Detail". Bolt circle diameter shall be 102 mm (4") minimum for Type I barricade and 127 mm (5") minimum for Type II barricade.
3. Steel sleeve to be constructed with a diameter 2.5 mm (1/10") larger than post. Wall thickness of sleeve to be same as post or larger.
4. Contractor may submit alternative details for approval by the Engineer.
5. For minimum pipe diameters and wall thickness, refer to ASTM A6M.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**SIGNAL, LIGHTING AND
ELECTRICAL SYSTEMS
PEDESTRIAN BARRICADES**

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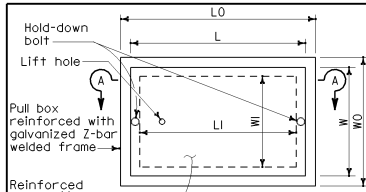
NO SCALE

ES-7P

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

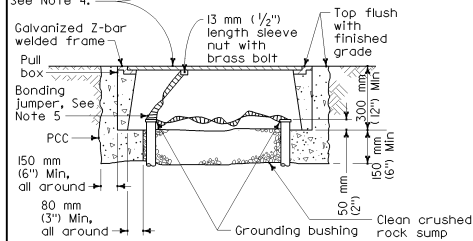
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REGISTERED PROFESSIONAL ENGINEER
 Jeffrey S. Woody
 No. C41260
 Exp. 3-31-03
 STATE OF CALIFORNIA



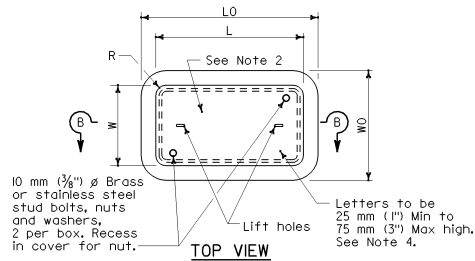
Reinforced 12 mm (1/2") Min steel plate cover, galvanized after fabrication, See Note 4.

TOP VIEW

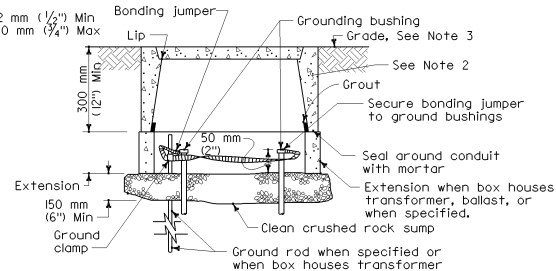


SECTION A-A

No. 3/2(T), No. 5(T) AND No. 6(T) TRAFFIC PULL BOX



TOP VIEW



SECTION B-B

INSTALLATION DETAILS

DIMENSION TABLE

Pull Box	CONCRETE BOX				NON-PCC BOX		CONCRETE OR NON-PCC COVERS					
	Minimum * Thickness	Minimum Depth Box and Extension	L0	W0	Minimum * Thickness	Minimum Depth Box and Extension	L **	W **	R	Edge Thickness	Edge Taper	
No. 3/2	25 mm (1")	No Extension	510 mm (20")	360 mm (14")	8 mm (3/4")	No Extension	390 mm (15 3/4")	260 mm (10 3/4")	30 mm (1 1/8")	45 mm (1 3/4")	3 mm (1/8")	
No. 5	25 mm (1")	560 mm (22")	710 mm (28")	460 mm (18")	8 mm (3/4")	510 mm (20")	590 mm (23 3/4")	350 mm (13 3/4")	32 mm (1 1/4")	50 mm (2")	3 mm (1/8")	
No. 6	40 mm (1 1/2")	600 mm (24")	910 mm (36")	580 mm (23")	10 mm (3/8")	510 mm (20")	780 mm (30 3/4")	450 mm (17 3/4")	32 mm (1 1/4")	50 mm (2")	3 mm (1/8")	

* Excluding conduit web

** Top dimension

DIMENSION TABLE

Pull Box	CONCRETE BOX						NON-PCC BOX		STEEL COVERS				
	Minimum * Thickness	Minimum Depth Box and Extension	L 0	W 0	L I	W I	Minimum * Thickness	Minimum Depth Box and Extension	L **	W **	R	Edge Thickness	Edge Taper
No. 3/2(T)	40 mm (1½")	300 mm (12")	530 mm (20¾") ±	370 mm (14½") ±	270 mm ± 25 mm (10⅝" ± 1")	430 mm ± 25 mm (17" ± 1")	Does Not Apply		510 mm (20") ±	350 mm (13¾") ±	0	13 mm (½")	None
No. 5 (T)	45 mm (1¾")	300 mm (12")	750 mm (29½") ±	480 mm (19") ±	330 mm ± 25 mm (13" ± 1")	600 mm ± 25 mm (23¾" ± 1")	Does Not Apply		690 mm (27") ±	410 mm (16") ±	0	13 mm (½")	None
No. 6 (T)	50 mm (2")	300 mm (12")	900 mm (35½") ±	600 mm (23¾") ±	470 mm ± 25 mm (17" ± 1")	760 mm ± 25 mm (30" ± 1")	Does Not Apply		840 mm (33") ±	510 mm (20") ±	0	13 mm (½")	None

* Excluding conduit web

** Top dimension

NOTES ON PULL BOXES

- Traffic pull box shall be provided with steel cover and special concrete footing. Steel cover shall have embossed non-skid pattern.
- Steel reinforcing shall be as regularly used in the standard products of the respective manufacturer.
- Top of pull boxed shall be flush with surrounding grade or top of adjacent curb, except that in unpaved areas where pull box is not immediately adjacent to and protected by a concrete foundation, pole or other protective construction, the box shall be placed with its top 30 mm (1 1/4") above surrounding grade. Where practicable, pull boxes shown in the vicinity of curbs shall be placed adjacent to the back of curb, and pull boxes shown adjacent to standards shall be placed on side of foundation facing away from traffic, unless otherwise noted. When pull box is installed in sidewalk area, the depth of the pull box shall be adjusted so that the top of the pull box is flushed with the top of the sidewalk.
- Pull box covers shall be marked as follows:
 - No. 3 1/2 pull box.
 - "SIGNAL" Traffic signal circuits with or without street and/or sign lighting circuits.
 - "ST LIGHTING" Street and/or sign lighting circuits where no voltage is above 600 V.
 - "SERVICE" Service circuits between service points and service disconnect.
 - "SPRINKLER-CONTR" Sprinkler control circuits, 50 V or less.
 - "CALTRANS" On all pull boxes, except pull boxes marked "SPRINKLER-CONTR".
 - "TELEPHONE" Telephone service.
 - No. 5, 6, 9 or 9A pull boxes
 - "TRAFFIC SIGNAL" Traffic signal circuits with or without street and/or sign lighting circuits.
 - "STREET LIGHTING" Street and/or sign lighting circuits where no voltage is above 600 V.
 - "STREET LIGHTING - HIGH VOLTAGE" Street and/or sign lighting circuits where voltage is above 600 V.
 - "SERVICE" Service circuits between service point and service disconnect.
 - "SPRINKLER-CONTROL" Sprinkler control circuits, 50 V or less.
 - "IRRIGATION" Circuits to irrigation controller 120 V or more.
 - "RAMP METER" Ramp meter circuits.
 - "COUNT STATION" Count and/or speed monitor circuits.
 - "COMMUNICATION" Communication circuits.
 - "CALTRANS" On all pull boxes, except pull boxes marked "SPRINKLER-CONTROL".
 - "TELEPHONE" Telephone service.
 - "TOS COMMUNICATIONS" TOS communications trunk line.
 - "TOS POWER" TOS power.
 - "TDC POWER" Telephone demarcation cabinet power.
 - "CCTV" Closed circuit television circuits.
 - "TMS" Traffic monitoring station circuits.
 - "CMS" Changeable message sign circuits.
 - "HAR" Highway advisory radio circuits.
- Bonding jumper for metal covers shall be 1 m (40") long, minimum.
- The nominal dimensions of the opening in which the cover sets shall be the same as the cover dimensions except the length and width dimensions shall be 3 mm (1/8") greater.
- All covers and boxes shall be interchangeable with California standard male and female gages. When interchanged with a standard male or female gage, the top surfaces shall be flushed within 3 mm (1/8"). Top outside edge of all concrete covers and pull boxes shall have a 6 mm (1/4") minimum radius.
- Pull boxes shall not be installed within the boundaries of new or existing curb ramps.
- Pull boxes for electroliners and signal standards shall be located at the same station 1.5 m (5') as the adjacent electroliner or signal standard. Pull boxes shall be placed adjacent to back of curb or edge of shoulder except where this is impractical, a box may be placed in another suitable protected and accessible location.

SIGNAL, LIGHTING AND ELECTRICAL SYSTEMS PULL BOX DETAILS

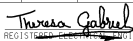
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NO SCALE

ES-8

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
Theresa Gabriel REGISTERED PROFESSIONAL ENGINEER No. 515123 Exp. 6-30-04 STATE OF CALIFORNIA					
July 1, 2002 PLANS APPROVAL DATE The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet. Caltrans now has a web site! To get to the web site, go to http://www.dot.ca.gov					

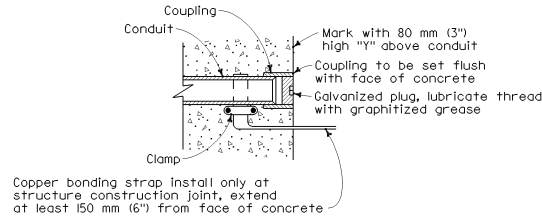
DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS


REGISTERED PROFESSIONAL ENGINEER
No. E15129
ELECTRICAL
STATE OF CALIFORNIA

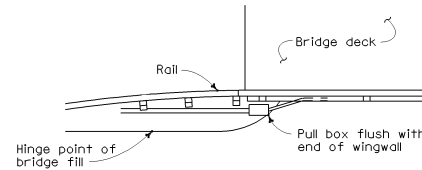
July 1, 2002
PLANS APPROVAL DATE

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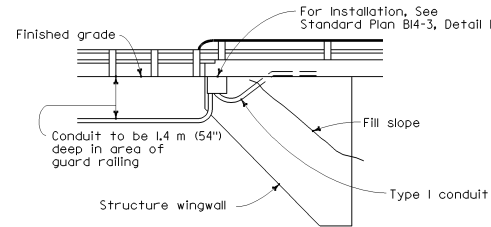
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DETAIL C
CONDUIT TERMINATION



TOP VIEW



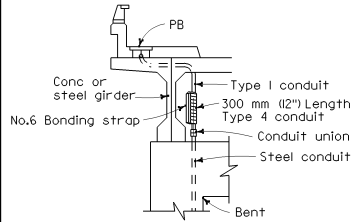
SIDE VIEW
DETAIL I
CONDUIT TERMINATION

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**SIGNAL, LIGHTING AND
ELECTRICAL SYSTEMS
ELECTRICAL DETAILS
STRUCTURAL INSTALLATIONS**

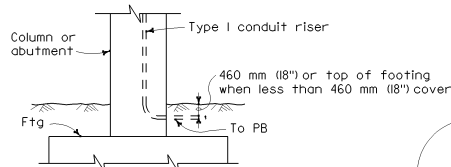
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NO SCALE

ES-9A

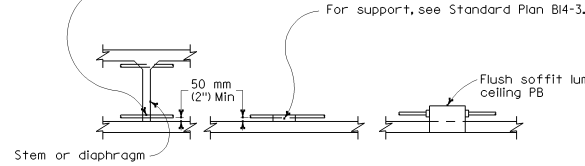


DETAIL R
CONDUIT RISER
CONNECTION

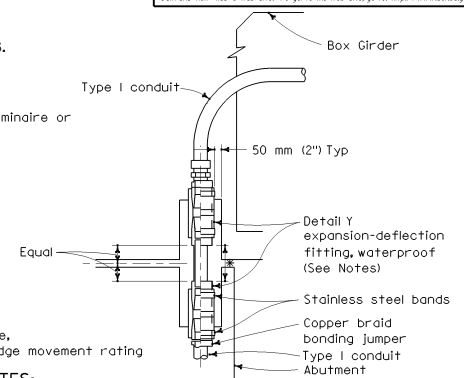


DETAIL T
LOWER END OF CONDUIT RISER
AT COLUMN OR ABUTMENT

Conduit passing through girder or diaphragm of box girder section shall be either cast into concrete or passed through opening. Opening shall not be drainage opening and shall be only as large as required to install conduit. Conduit shall be run either parallel to or at right angles to girders.



DETAIL S
CONDUIT INSTALLATION WITHIN
BOX GIRDER SECTIONS

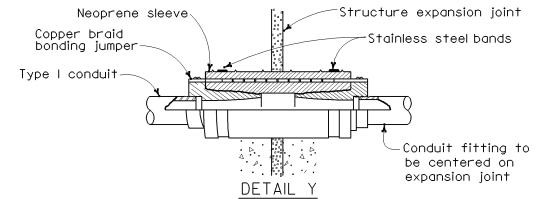


* Conduit nipple,
Length = Bridge movement rating

NOTES:

1. Fitting and pocket required only where movement can occur between girder and abutment.
2. Fill pocket around fitting with resilient waterproof compound.

DETAIL Y
CONDUIT RISER CONNECTION
AT COLUMN OR ABUTMENT



CONDUIT EXPANSION-DEFLECTION FITTING

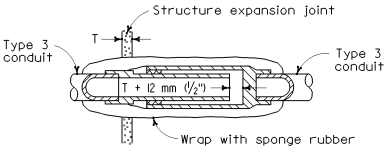
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
SIGNAL, LIGHTING AND
ELECTRICAL SYSTEMS
ELECTRICAL DETAILS
STRUCTURE INSTALLATIONS

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NO SCALE

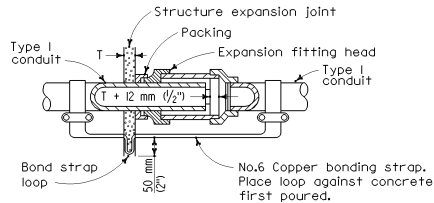
ES-9B

2002 DUAL UNITS STD PLAN ES-9B



NON-METALLIC CONDUIT INSTALLATION

(To be used only when shown or specified on Project Plans)

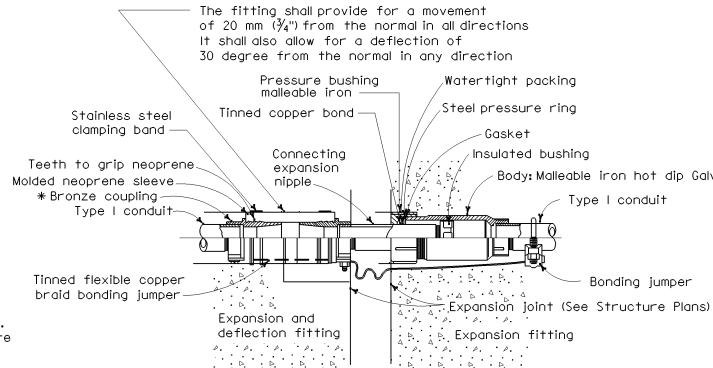


METALLIC CONDUIT INSTALLATION

DETAIL X
CONDUIT EXPANSION FITTINGS

NOTES:

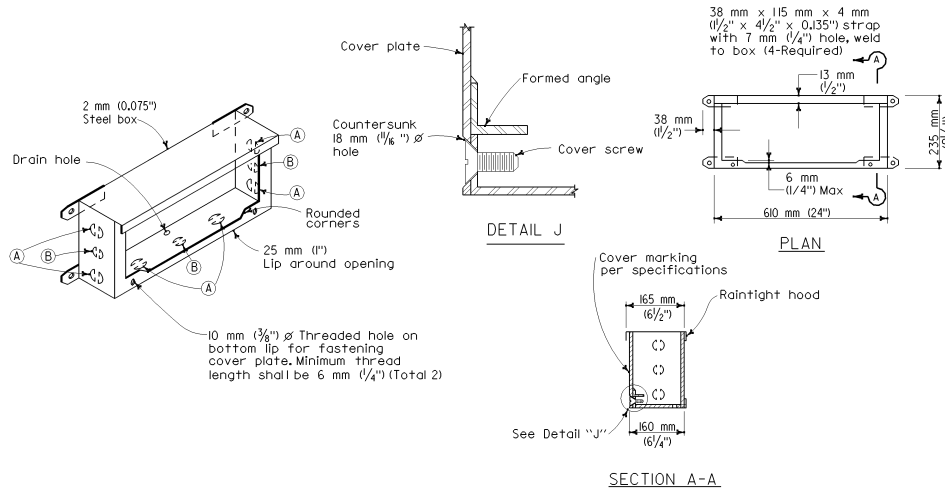
1. Except for sidewalk joints, a conduit expansion fitting or expansion-deflection fitting shall be installed at each 12 mm (1/2") or greater structure joint, hinge or abutment.
2. Fittings or combination of fittings shall be installed to accommodate the movement rating as shown on the structure plans.
3. Fittings shall be installed parallel to superstructure girders.
4. Where lateral movement greater than 6 mm (1/4") may occur, a neoprene sleeve expansion-deflection fitting shall be installed straddling the joint.
5. The external bond strap may be omitted when the fitting is provided with an internal bond equivalent to a No.6 copper bond in Type I conduit or the No.8 equipment grounding conductor in Type 3 conduit.



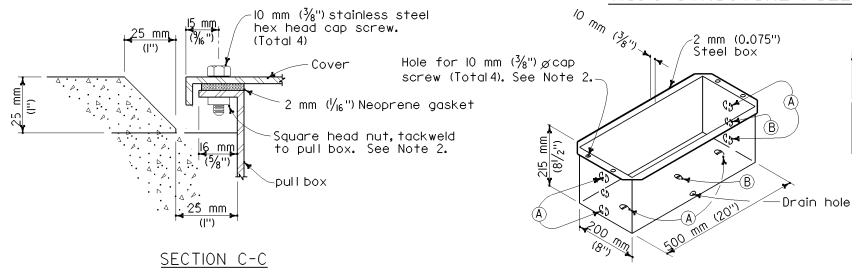
DETAIL XY

COMBINATION EXPANSION-DEFLECTION FITTINGS

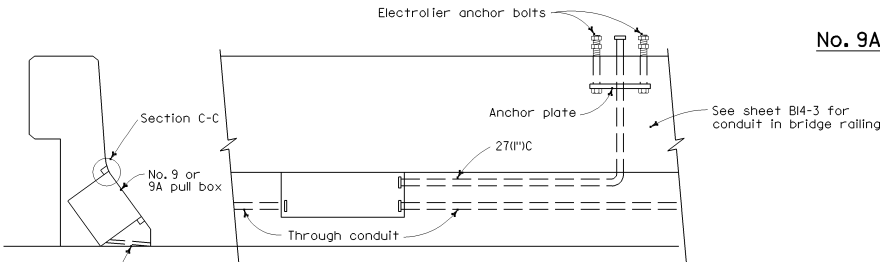
* Fittings shall be cast iron or hot dip Galv



No. 9 STRUCTURE PULL BOX



No. 9A STRUCTURE PULL BOX

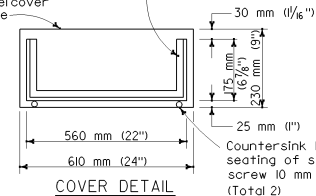


INSTALLATION IN SLOPING PARAPETS

For reinforcement in area of electroliner, see railing sheets. For electroliner anchor bolts, see Standard Plan ES-6B.

38 mm x 115 mm x 4 mm
(1 1/2" x 4 1/2" x 0.135") strap
with 7 mm (1/4") hole, weld
to box (4-Required)

3 mm (1/8")
Steel cover
plate



INSTALLATION NOTES:

Box axis shall be parallel to top of railing.
Close box during pouring with 6 mm (1/4") plywood
plywood of sufficient size to provide 1d chamfer
on 3 sides of cover. Upper edge of plywood shall
fit against lower edge of raintight hood.

DIST.	COUNTY	ROUTE	KILOMETER	POST	SHEET	TOTAL
			TOTAL PROJECT	NO.	SHEETS	
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NOTES: NO. 9 AND 9A PULL BOX

- All corner joints to be lapped and secured by spot welding or riveting.
- Where cap screws are used to attach cover to box, either of the following methods of providing adequate threading may be used:
 - Tack weld square nut to bottom of flange (total 4), or
 - Tack weld a 6 mm x 16 mm x 200 mm (1/4" x 5/8" x 8") bar beneath flange (total 2).
- Pound knockouts flat after punching.
- Multiple size knockouts will not be permitted.
- Pull box covers shall be marked as shown on Standard Plan ES-8.

KNOCKOUT SCHEDULE No. 9 AND 9A PULL BOX

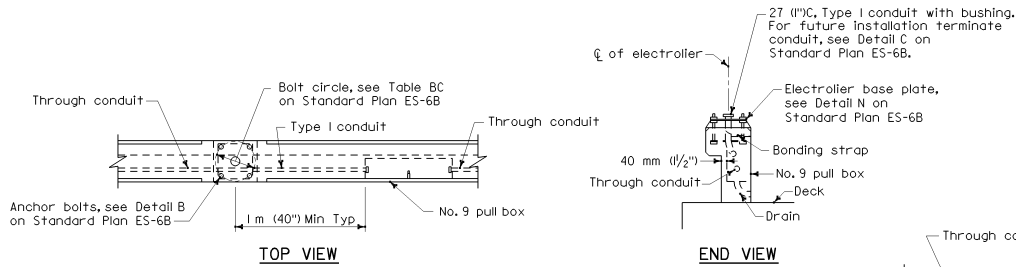
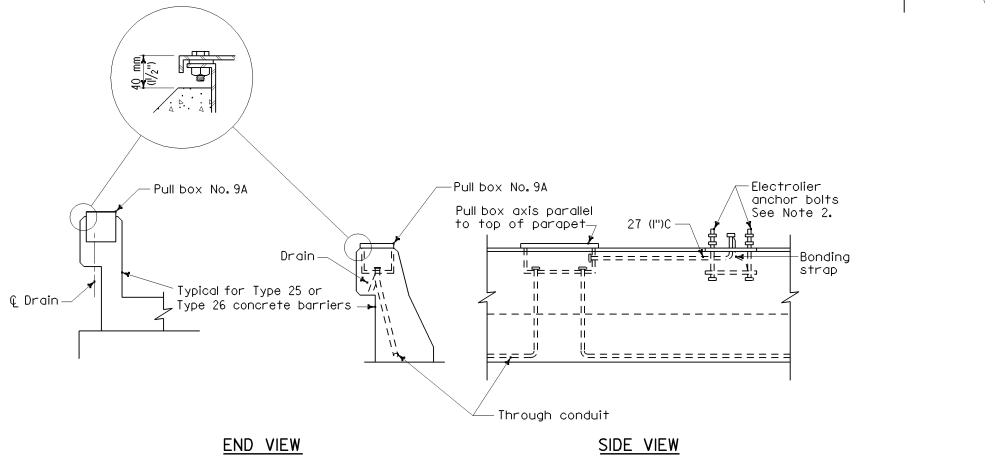
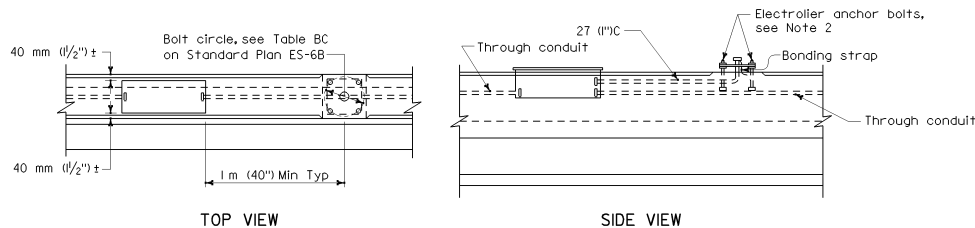
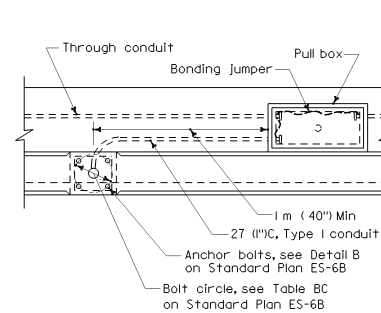
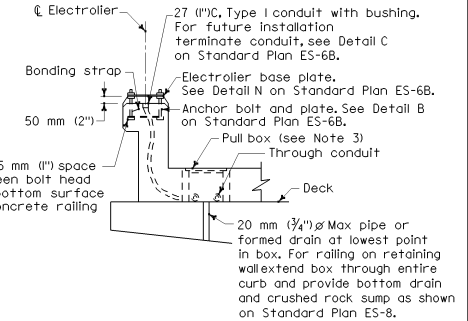
- 4 (1/2") C, 2 each end, 2 on bottom.
- 27 (1 1/4") C, 1 each end, 1 on bottom.

SIGNAL, LIGHTING AND ELECTRICAL SYSTEMS ELECTRICAL DETAILS STRUCTURE INSTALLATIONS

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NO SCALE

ES-9C

**No. 9 PULL BOX INSTALLATION****END VIEW****SIDE VIEW****TOP VIEW****SIDE VIEW****No. 9A PULL BOX INSTALLATION****TOP VIEW****END VIEW****No. 3 1/2, 5 OR 6 PULL BOX INSTALLATION****NOTES:**

1. Axis of pull box shall be parallel to top of barrier, sidewalk, or railing.
2. See railing sheet for reinforcement and structural details at electroliers and pull boxes.
3. Top of pull boxes in sidewalk areas shall be flush with top of sidewalk. Modify base of pull box as required.
4. Boxes inside of vertical barrier or railing shall be closed during pouring of PCC with 6 mm (1/4)\"/>

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**SIGNAL, LIGHTING AND
ELECTRICAL SYSTEMS
ELECTRICAL DETAILS
STRUCTURE INSTALLATIONS**

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NO SCALE

ES-9D

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

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STATE OF CALIFORNIA

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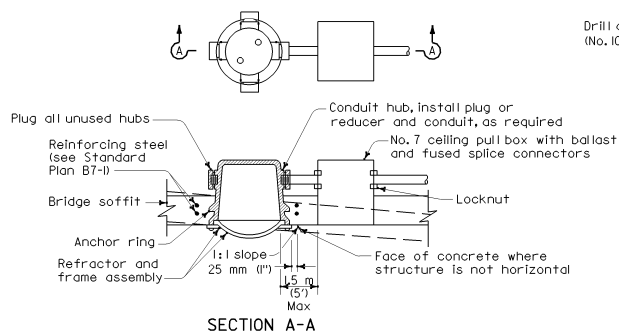
DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
				15123	

Theresa Gabriel
REGISTERED PROFESSIONAL ENGINEER
No. 15123
Exp. 6-30-04
STATE OF CALIFORNIA

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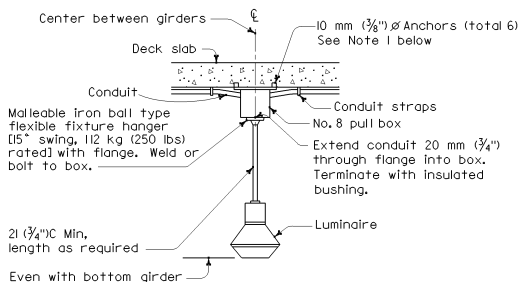


NOTES

1. Place 6 mm (1/4") plywood disk in body opening during pouring.
2. Install luminaire with axis vertical and "street side" of refractor oriented as indicated on lighting layout.
3. Luminaire shall be located so as to provide minimum clearance of 600 mm (24") from inside surface of girders and 300 mm (12") from near face of diaphragm.

DETAIL F

FLUSH SOFFIT LUMINAIRE INSTALLATION

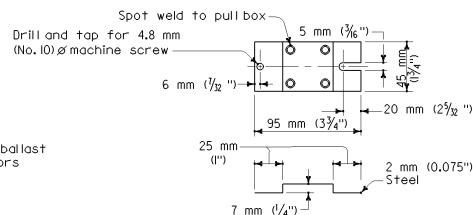


NOTES

1. Cast-in-place inserts or expansion anchor.
2. For future installation, omit suspension conduit and luminaire, close flange with galvanized plug.
3. If conduit smaller than the knockout size is used it shall be bonded to the box.

DETAIL P

PENDANT SOFFIT LUMINAIRE INSTALLATION



TERMINAL BLOCK MOUNTING BRACKET

Provide one-size 41 mm (1 1/2") and one-size 27 mm (1") knockout on each of four sides. Pound flat after punching.

4-75 mm (3") Lengths of 25 mm x 25 mm x 3 mm (1 inch x 1 inch x 0.105 inch) steel angle welded to box, one per side. Punch 5 mm (3/16 inch) holes in outstanding leg.

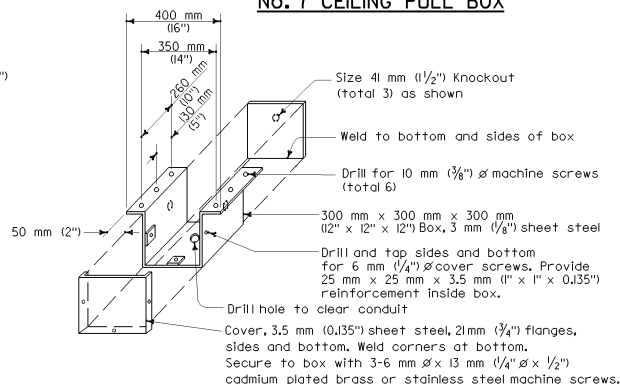
Drill and tap top and bottom flanges for 6 mm (1/4 inch) 20NC screws

Secure top and bottom covers with eight 6 mm (1/4 inch) 20NC brass machine screws

NOTES:

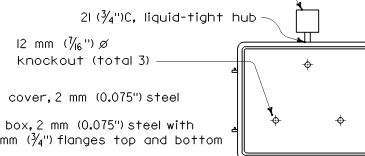
1. Install with bottom flange flush with concrete.
2. Both covers shall be on box during pouring.

No. 7 CEILING PULL BOX



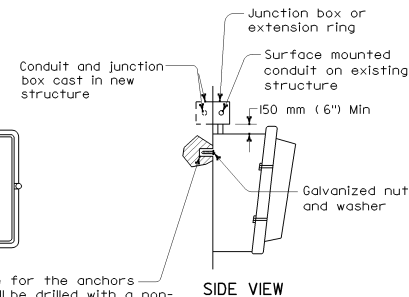
No. 8 PULL BOX

130 mm x 150 mm x 100 mm (5 inch x 6 inch x 4 inch)
NEMA Type 4 (3.42 mm (0.135 inch) junction box (see notes below)



Center and weld terminal block mounting bracket on inside of box, with bracket's long side parallel to box opening.

Bottom cover, 2 mm (0.075 inch) steel. Hole spacing same as top.



Hole for the anchors shall be drilled with a non-percussion type drill. When reinforcing steel is encountered, the anchor shall be relocated and abandoned hole plugged with color matching PCC mortar.

DETAIL W

WALL LUMINAIRE INSTALLATION

Typical

NOTES

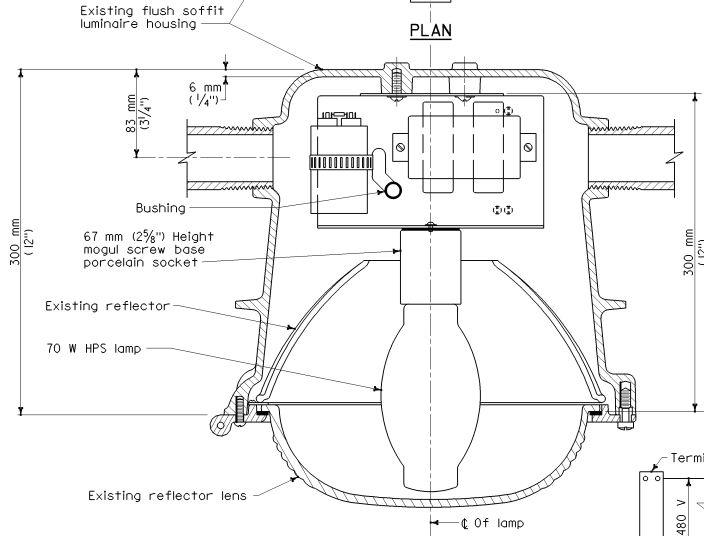
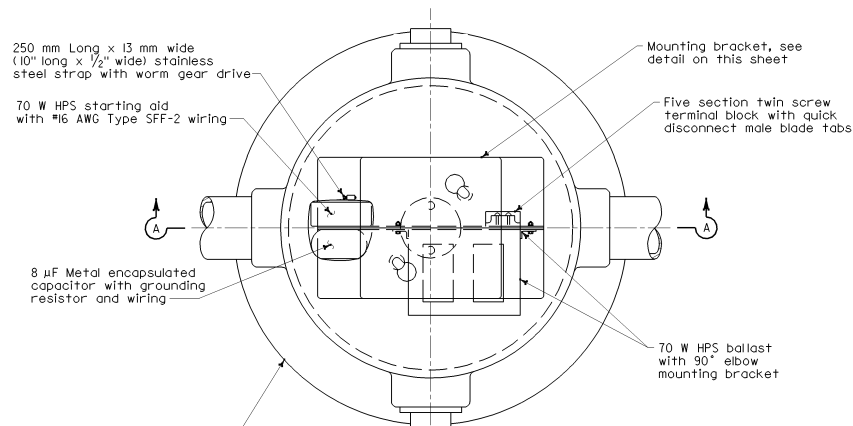
1. For existing structures, provide external mounting taps (total 4).
2. For new structures, provide extension ring.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**SIGNAL, LIGHTING AND ELECTRICAL SYSTEMS
ELECTRICAL DETAILS
STRUCTURE INSTALLATIONS**

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NO SCALE

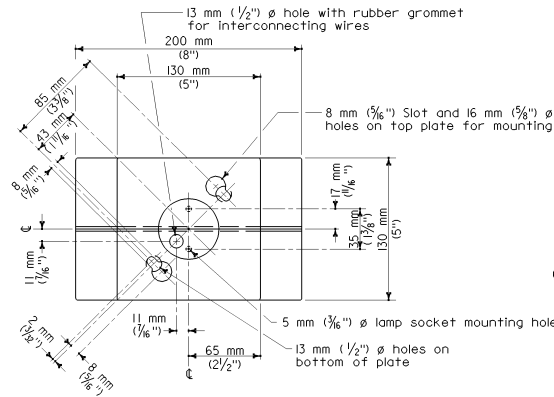
ES-9E



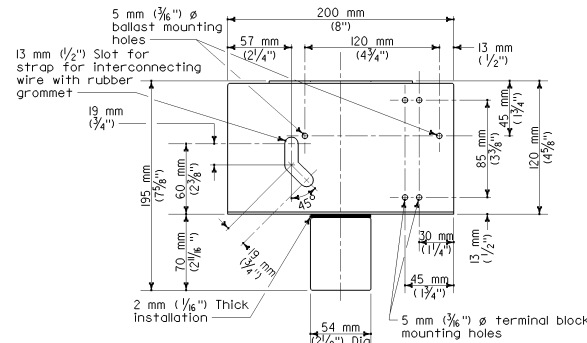
SECTION A-A
FLUSH SOFFIT LUMINAIRE ASSEMBLY

NOTES

1. All fixture wiring shall be Type SFF-2.
2. Use 4.2 mm (No. 8) ϕ machine screws, lockwashers and nuts for mounting ballast and terminal strips.
3. In-line fuse as required on Standard Plan ES-138.

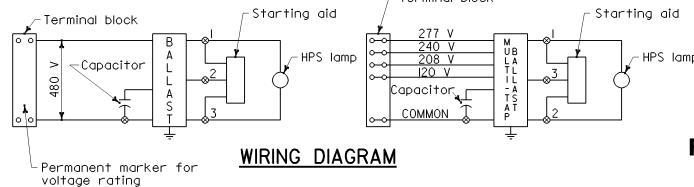


TOP VIEW

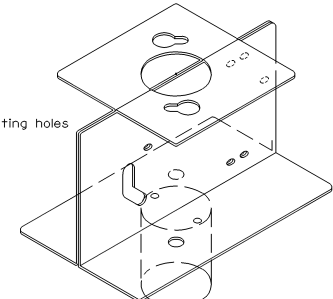


FRONT VIEW

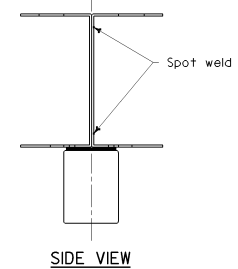
MOUNTING BRACKET DETAILS



DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
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Preform two sheets 1.6 mm (1/16") mild steel as shown, spotweld together in each corner with four spotwelds.



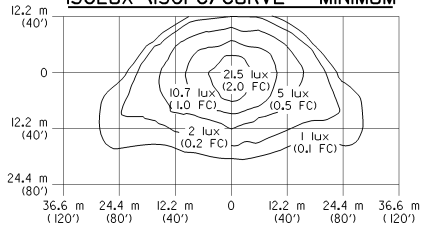
STATE OF CALIFORNIA
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SIGNAL, LIGHTING AND ELECTRICAL SYSTEMS FLUSH SOFFIT LUMINAIRE MODIFICATION DETAILS STRUCTURE INSTALLATIONS

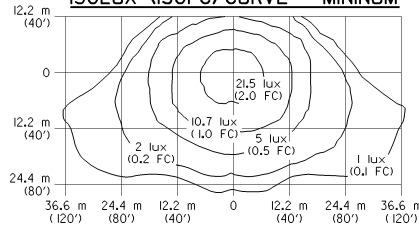
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NO SCALE

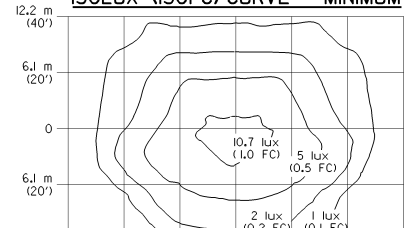
ES-9F

ISOLUX (ISOFC) CURVE - MINIMUM**TYPE III MEDIUM CUTOFF**

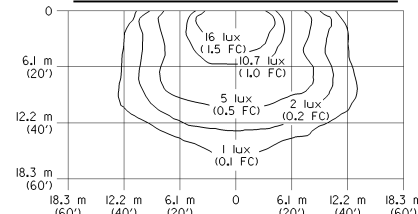
Cutoff Luminaire 9.1 m (30') Mounting Height
Lamp Operated at 22 000 lm
200 W High Pressure Sodium Lamp
ANSI Designation S66

ISOLUX (ISOFC) CURVE - MINIMUM**TYPE III MEDIUM CUTOFF**

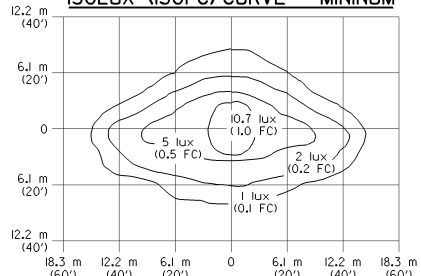
Cutoff Luminaire 12.2 m (40') Mounting Height
Lamp Operated at 37 000 lm
310 W High Pressure Sodium Lamp
ANSI Designation S67

ISOLUX (ISOFC) CURVE - MINIMUM**DETAIL "F" SOFFIT LUMINAIRE**

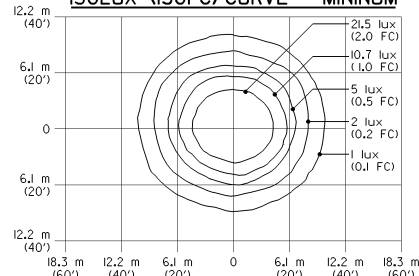
5.2 m (17') Mounting Height
Lamp Operated at 37 000 lm
310 W High Pressure Sodium Lamp
ANSI Designation S67

ISOLUX (ISOFC) CURVE - MINIMUM**DETAIL "W" WALL LUMINAIRE**

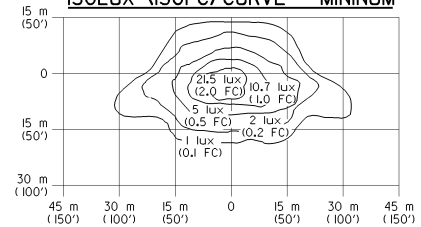
4.6 m (15') Mounting Height
Lamp Operated at 9500 lm
100 W High Pressure Sodium Lamp
ANSI Designation S54

ISOLUX (ISOFC) CURVE - MINIMUM**PENDANT SOFFIT LUMINAIRE - 70 W****TYPE III SHORT**

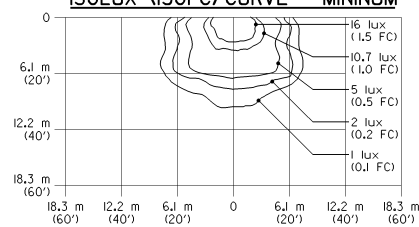
5.2 m (17') Mounting Height
Lamp Operated at 5800 lm
High Pressure Sodium Lamp
ANSI Designation S62

ISOLUX (ISOFC) CURVE - MINIMUM**PENDANT SOFFIT LUMINAIRE - 70 W**

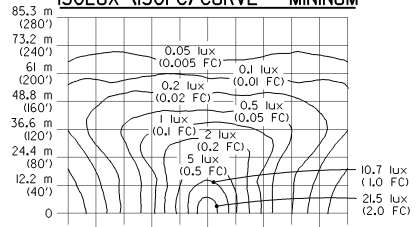
5.2 m (17') Mounting Height
Lamp Operated at 5800 lm
High Pressure Sodium Lamp
ANSI Designation S62

ISOLUX (ISOFC) CURVE - MINIMUM**TYPE III MEDIUM CUTOFF**

Cutoff Luminaire 9.1 m (30') Mounting Height
Lamp Operated at 16 000 lm
150 W High Pressure Sodium Lamp
ANSI Designation S55

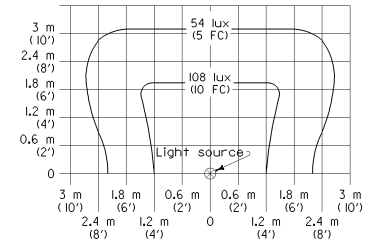
ISOLUX (ISOFC) CURVE - MINIMUM**DETAIL "W" WALL LUMINAIRE**

4.6 m (15') Mounting Height
Lamp Operated at 33 000 lm
150 W High Pressure Sodium Lamp
ANSI Designation S55

ISOLUX (ISOFC) CURVE - MINIMUM**LOW PRESSURE SODIUM LUMINAIRE**

12.2 m (40') Mounting Height
Lamp Operated at 33 000 lm
180 W Low Pressure Sodium Lamp

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
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SIGN LIGHTING FIXTURE ISOLUX (ISOFC) DIAGRAM

- Curves represent the minimum lux (FC) of initial illumination on a 3 m x 6 m (10' x 20') panel.
- The lux (FC) shown are with the fixture attached to the light fixture mounting channel which places the center of the source 1420 mm (56") in front of panel and 300 mm (12") below the bottom edge.
- Applicable lamp: 175-W deluxe white mercury, H 39KC - R175/DX rated at approximately 8150 lm.

NOTE

Isolux diagrams show the minimum horizontal lux (FC) required.

ABBREVIATIONS

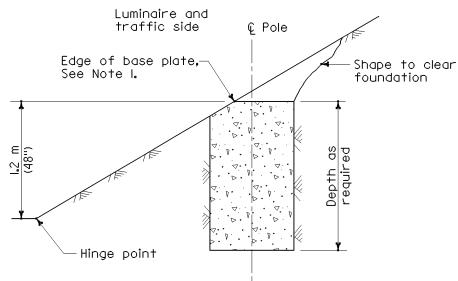
FC - Foot candle
ISOFC - Isofoot - candle

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
SIGNAL, LIGHTING AND ELECTRICAL SYSTEMS ISOLUX DIAGRAMS

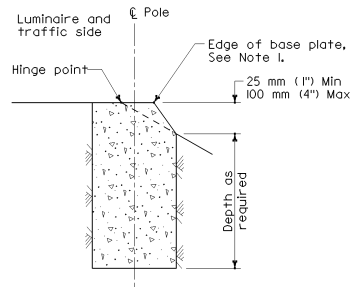
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NO SCALE

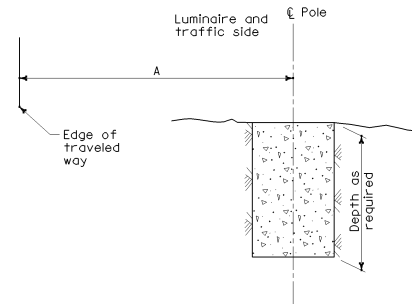
ES-10



**CUT SLOPES
STEEPER THAN 1:4 (4:1)**
See Note 2

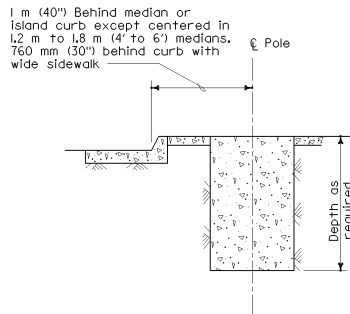


**FILL SLOPES
STEEPER THAN 1:4 (4:1)**
See Note 2

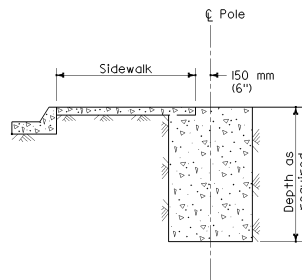


**FLAT SECTIONS, CUT OR FILL SLOPES
1:4 (4:1) OR FLATTER**

**FOUNDATIONS ADJACENT TO ALL ROADWAYS EXCEPT
IN SIDEWALK, MEDIAN AND ISLAND AREAS**



**MEDIAN ISLAND
OR WIDE SIDEWALK**
2 m (80") Wide and wider



NARROW SIDEWALK
Less than 2 m (80") wide

FOUNDATIONS IN SIDEWALK, MEDIAN AND ISLAND AREAS

NOTES

1. Where a portion of the foundation is above grade the top edges shall have a 25 mm (1") chamfer.
2. Horizontal setbacks on cut and fill slopes steeper than 1:4 (4:1) shall not exceed the distances shown for flat sections.

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

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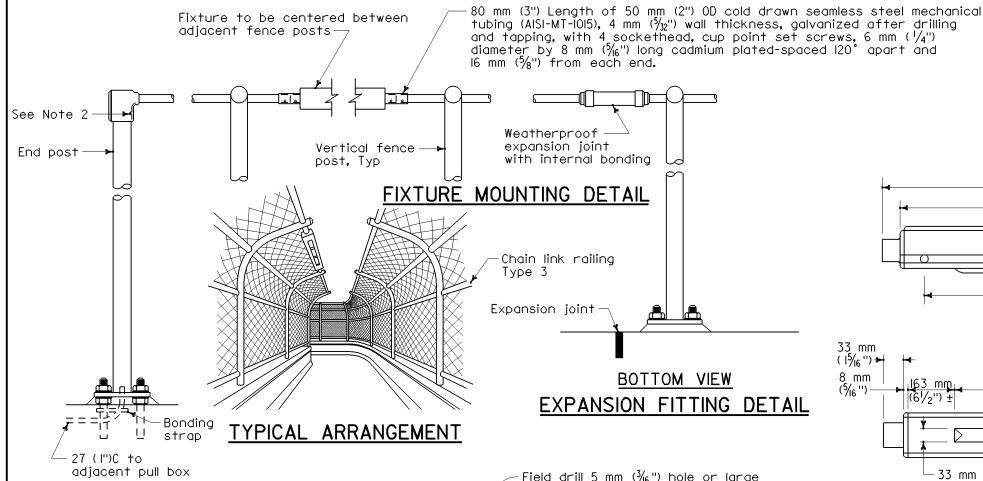
STANDARD TYPE	SETBACK (DIMENSION A)
32	9 m (30') Min
31, 36-20A	6 m (20') Min
30	Most Arm Length (Min)
22, 35	
15	

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**SIGNAL, LIGHTING AND
ELECTRICAL SYSTEMS
FOUNDATION INSTALLATIONS**

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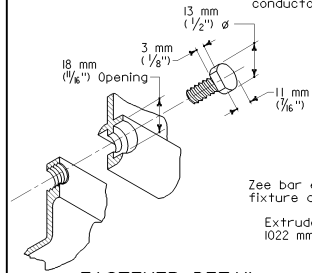
NO SCALE

ES-11

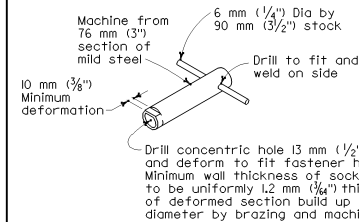


END POST DETAIL

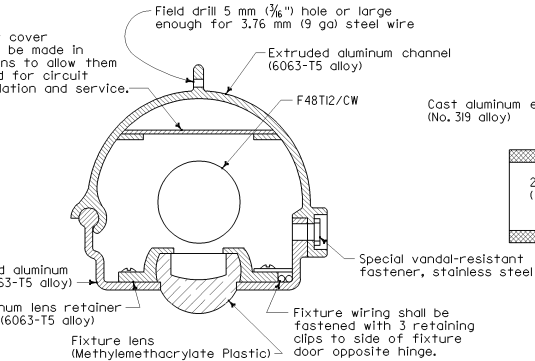
Aluminum wireway cover (3003 H14 alloy) to be made in two equal sections to allow them to be telescoped for circuit conductor installation and service.



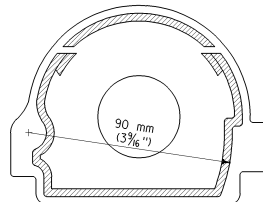
FASTENER DETAIL



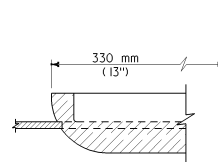
SPECIAL SOCKET WRENCH



SECTION A-A



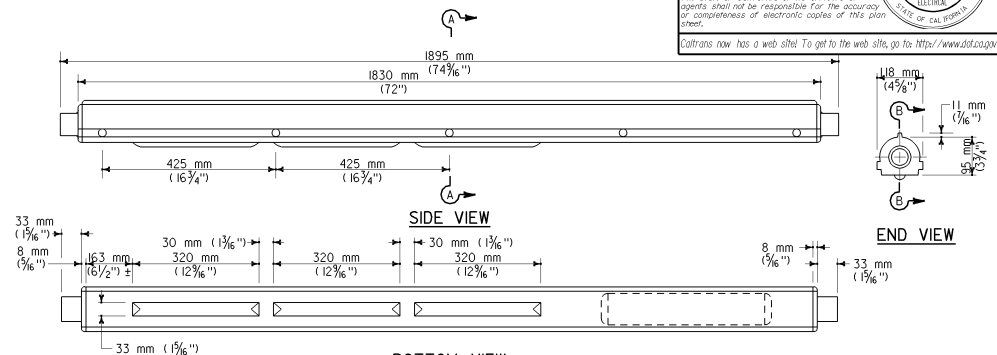
INSIDE VIEW OF END CASING



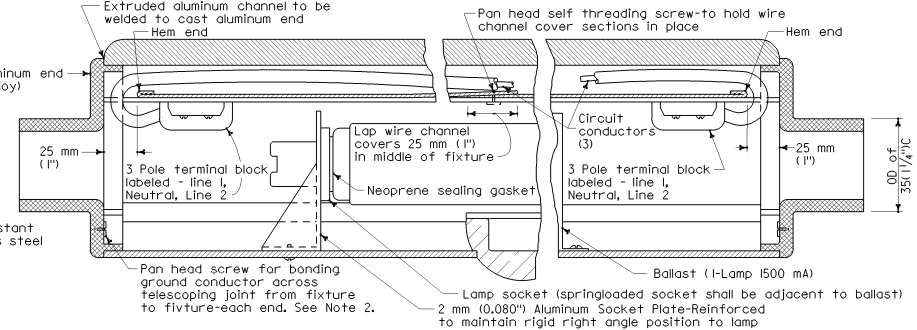
FIXTURE LENS

NOTES

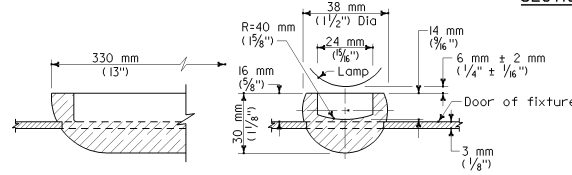
1. The maximum tolerance between door and lens is 0.4 mm (1/64"). Casting dimensions of shell are nominal and are subject to such tolerances as are consistent with sound foundry practice.
2. Continuous grounding between fixtures and from fixture to end post carrying conductors shall be provide.



BOTTOM VIEW



SECTION B-B



STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION SIGNAL, LIGHTING AND ELECTRICAL SYSTEMS PEDESTRIAN OVERCROSSING FLUORESCENT LIGHTING FIXTURE

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NO SCALE

ES-12A

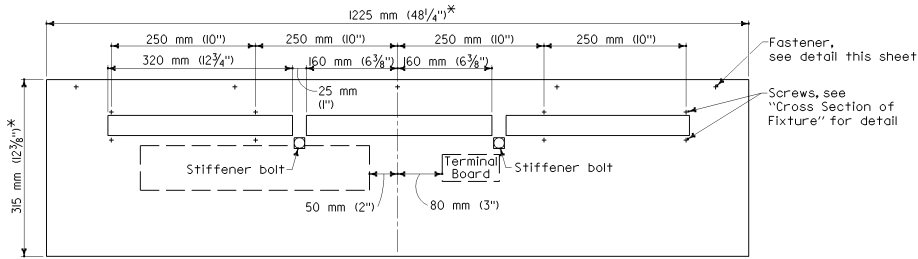
DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

Theresa Gabriel
REGISTERED PROFESSIONAL ENGINEER
No. E15129
Exp. 6-30-04
STATE OF CALIFORNIA

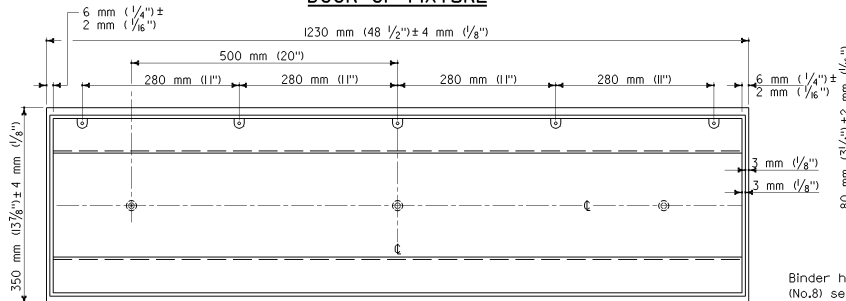
July 1, 2002
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DOOR OF FIXTURE

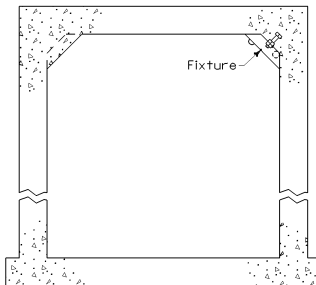


SHELL OF FIXTURE

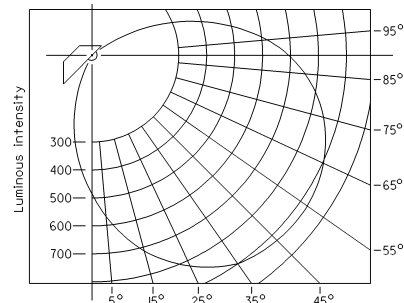
*Dimensions of door shall vary to fit fixture shell within 2 mm (1/16") of actual door recess dimensions.

NOTES:

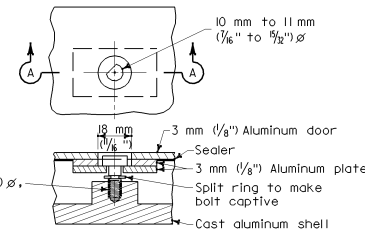
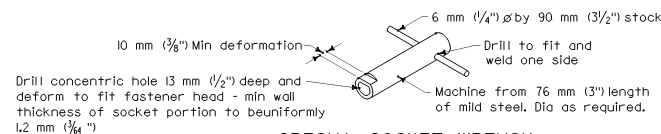
1. The maximum tolerance between door and lens shall be 0.4 mm (1/64").
2. Casting dimensions of shell are nominal and are subject to such tolerances as are consistent with sound foundry practice.
3. For fixture locations see Highway or Structure Lighting Plan.



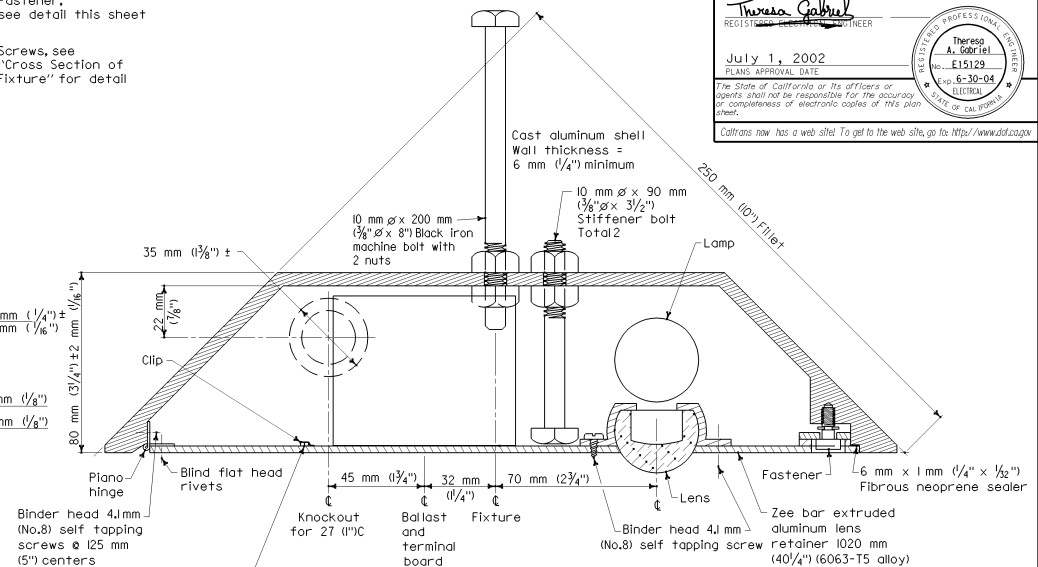
TYPICAL CROSS SECTION OF PEDESTRIAN UC



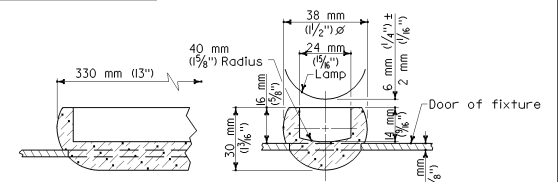
TYPICAL LUMINOUS INTENSITY DISTRIBUTION

SECTION A-A
FASTENER DETAIL

SPECIAL SOCKET WRENCH



CROSS SECTION OF FIXTURE



FIXTURE LENS

NOTE

When fixture shell is installed, stiffener bolts shall be set with about 3 mm (1/8") clearance behind bolt head and door before placing concrete. When fixture door is mounted, stiffener bolts shall be reset to barely clear inside of fixture door and inside nut shall be tightened.

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SIGNAL, LIGHTING AND ELECTRICAL SYSTEMS PEDESTRIAN UNDERCROSSING FLUORESCENT LIGHTING FIXTURE

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NO SCALE

ES-12B

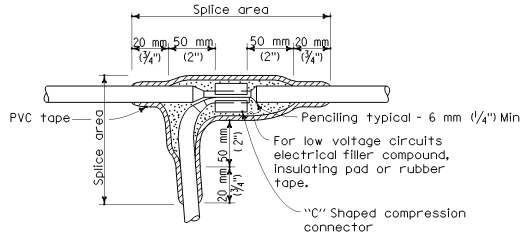
DIST.	COUNTY	ROUTE	KILOMETER TOTAL PROJECT	POST NO.	SHEET NO.	TOTAL SHEETS

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No. E15123
Exp. 6-30-04
STATE OF CALIFORNIA

July 1, 2002
PLANS APPROVAL DATE

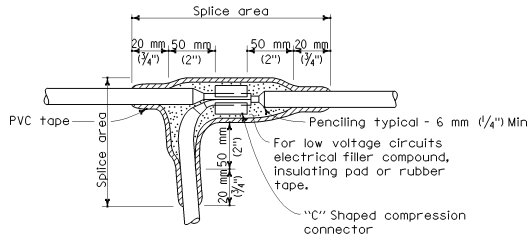
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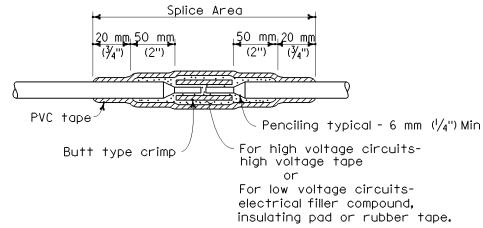
TYPE "C" SPLICE

Between 1 free-end and 1 through conductor



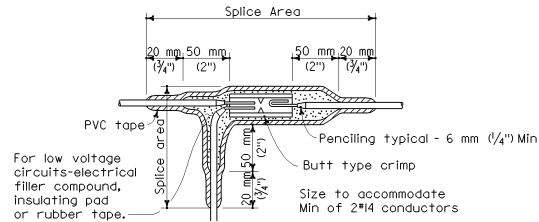
TYPE "T" SPLICE

For 3 free-ends



TYPE "S" SPLICE

Between 2 free-ends



TYPE "ST" SPLICE

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
<p><i>Theresa Gabriel</i> REGISTERED PROFESSIONAL ENGINEER No. E15123 EXPIRATION DATE 6-30-04 STATE OF CALIFORNIA</p>					
<p>July 1, 2002 PLANS APPROVAL DATE</p>					
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NOTES

1. All dimensions are minimum.
2. Rubber tapes shall be rolled after application.

INSULATION METHODS

Low Voltage Circuits (0-600 V)

METHOD "A" (Used only when specified)

1. Completely cover the splice area with electrical insulating coating and allow to dry.
2. Apply electrical filler compound with minimum thickness of 4 mm (0.15").
3. Apply 3 layers half lapped polyvinyl chloride tape.
4. Cover entire splice with electrical insulating coating and allow to dry.

OR

METHOD "B"

1. Completely cover the splice area with electrical insulating coating and allow to dry.
2. Apply 2 layers of electrical insulating pad with minimum thickness of 4 mm (0.15") each layer or 2 layers, half lapped, synthetic oil resistant, self fusing rubber tape.
3. Apply 3 layers half lapped polyvinyl chloride tape.
4. Cover entire splice with electrical insulating coating and allow to dry.

High Voltage Circuits (Over 600 V)

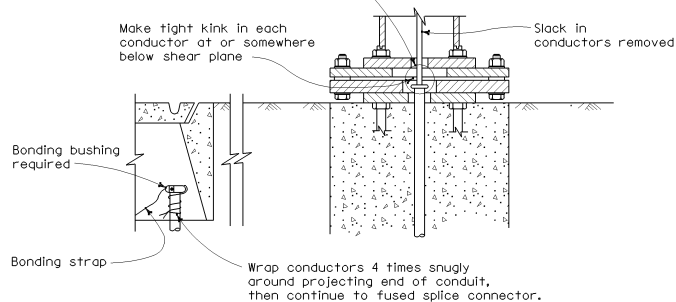
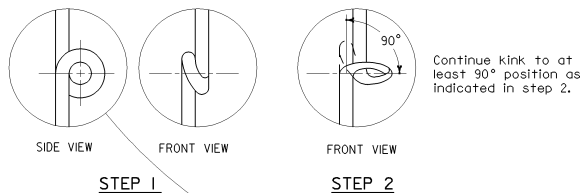
1. Completely cover the splice area with electrical insulating coating and allow to dry.
2. Apply high voltage tape to a minimum thickness equal to original insulation.
3. Apply 3 layers half lapped polyvinyl chloride tape.
4. Cover entire splice with electrical insulating coating and allow to dry.

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION SIGNAL, LIGHTING AND ELECTRICAL SYSTEMS SPLICING DETAILS

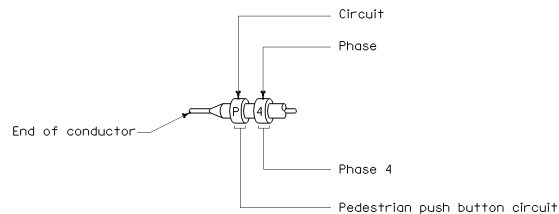
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NO SCALE

ES-13A



KINKING DETAIL FOR SLIP BASE STANDARDS



TYPICAL BANDING OF CONDUCTORS ENDS

Primary lines of multiple ballasts shall be provided with fused connectors.
Fuse ratings shall be as noted below.

CIRCUIT VOLTAGE	FUSE VOLTAGE RATING	FUSE CURRENT RATING																
		HPS LAMP BALLAST							LOW PRESSURE SODIUM BALLAST						MERCURY LAMP BALLAST	MULTIPLE TO MULTIPLE TRANSFORMERS (PRIMARY SIDE)		
		70 W	100 W	150 W	200 W	250 W	310 W	400 W	35 W	55 W	90 W	135 W	180 W	175 W	1 kVA	2 kVA	3 kVA	
120 V	250 V	5	5	5	5	6	10	10	5	5	8	10	10	10	10	25	35	
240 V	250 V	5	5	5	5	5	5	5	3	3	4	5	5	5	6	10	20	
480 V	500-600 V	5	5	5	5	5	5	5	2	2	2	3	3	5	3	6	10	

FUSE RATINGS FOR FUSED CONNECTORS LUMINAIRE BALLAST FUSING

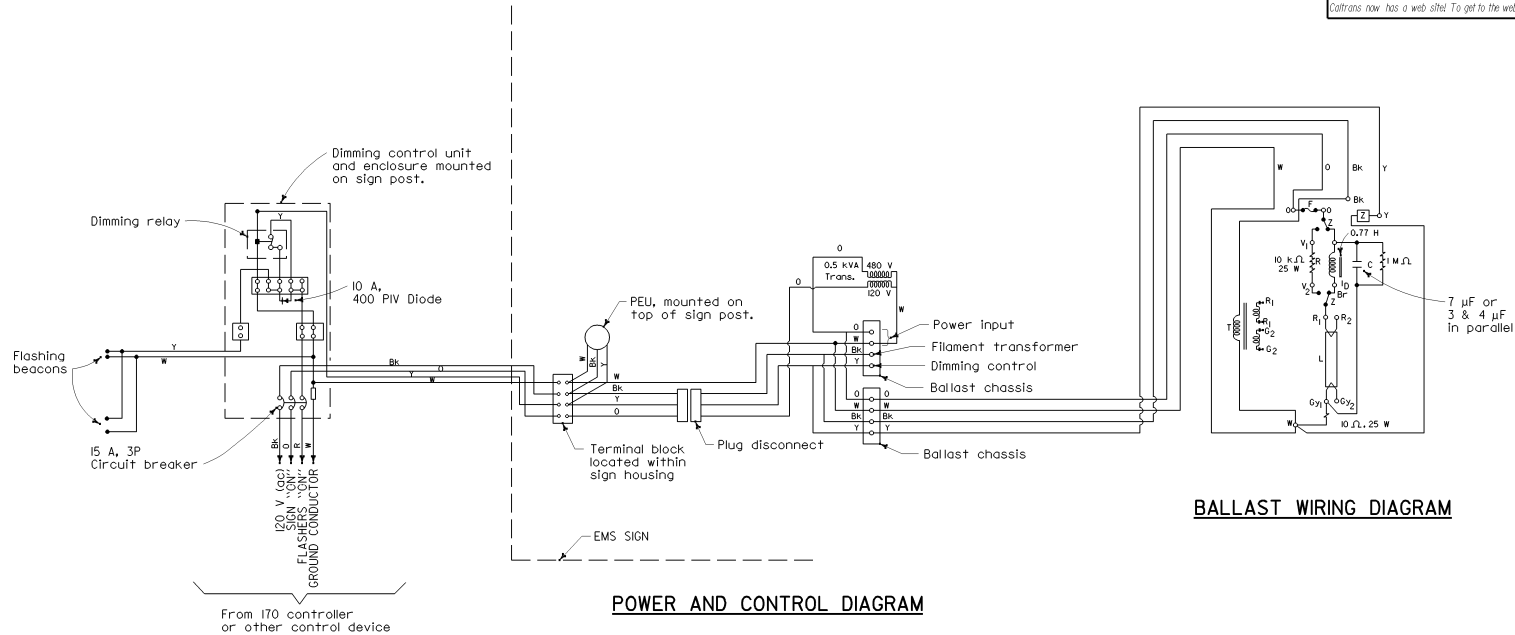
STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION SIGNAL, LIGHTING AND ELECTRICAL SYSTEMS WIRING DETAILS AND FUSE RATINGS

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NO SCALE

ES-13B

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CONDUCTOR COLORS	
R	- Red
O	- Orange
Y	- Yellow
G	- Green
B	- Blue
V	- Violet
Bk	- Black
W	- White
Br	- Brown
Gr	- Gray

WIRING NOTES AND SYMBOLS

- o Indicates point on terminal block (Letter at terminal indicated color or wires terminated there).
- T Heater filament transformer, windings R & GY, 4 V at 1.25 A under load.
- C Power factor correction capacitor, 680 V (ac) rating.
- R Resistor (Ballast) 30 mA (for nighttime dimmed level).
- I Inductor (Ballast) 1400 mA (for daytime high level).
- Z Relay, DPDT, for dimming control (120 V Coil).
- F Fuse, 5 A, 600 V, 10 mm ($\frac{9}{16}$ ") [D] x 38 mm ($1\frac{1}{2}$ ") [L], non-time delay type.

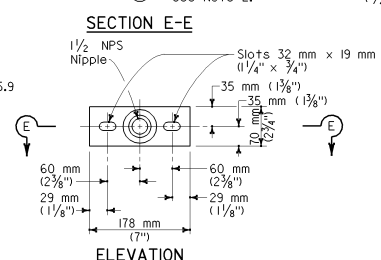
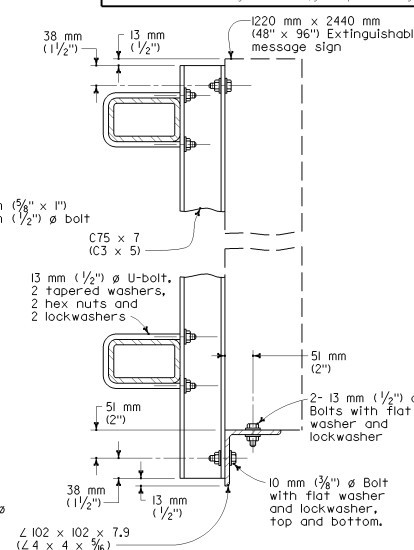
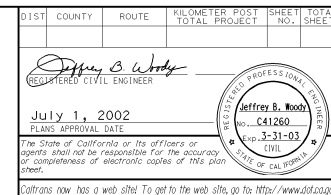
STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION SIGNAL, LIGHTING AND ELECTRICAL SYSTEMS EXTINGUISHABLE MESSAGE SIGN 250 mm (10") LETTERS

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NO SCALE

ES-14B

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- ## NOTES
1. For general notes, base plates, anchor bolts and foundations refer to Lightweight Signs, Post Details and Foundation Details sheets of the Standard Plans.
 2. For details of special 90° elbow, see Standard Plan ES-4D.
 3. For sign structure dimensions, see Project Plans.
 4. Pole plate shall be bronze, aluminum or ductile Iron as specified in the Standard Specifications.
 5. For Bolt-Access Hole Details, see Overhead Signs-Truss Frame Junctionure Details.

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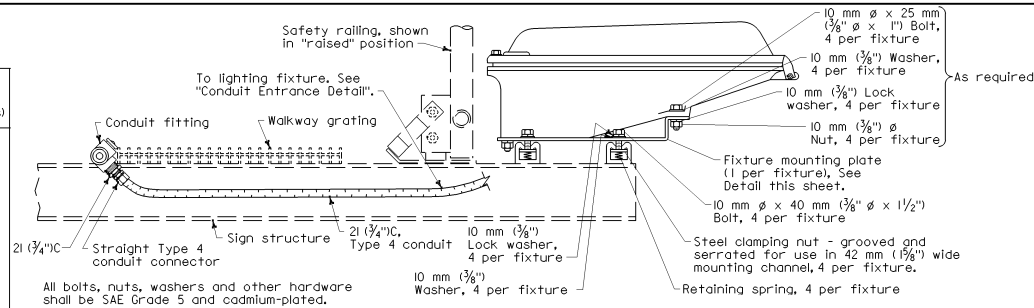
**SIGNAL, LIGHTING AND
ELECTRICAL SYSTEMS
EXTINGUISHABLE MESSAGE
SIGN AND FLASHING BEACONS**

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NO SCALE

ES-14C

Length of Panel	Number of Fixtures (Each)	Fixture Spacing See Notes #1 and #2	Lamp Size (Watts)	Sign Load (Watts)
1.5 m (5')	1	750 mm (30")	202	
1.8 m (6')		900 mm (36")		
2.1 m (7')		1050 mm (42")		
2.4 m (8')		1200 mm (48")		
2.7 m (9')		1350 mm (54")		
3 m (10')		1500 mm (60")		
3.4 m (11')		1650 mm (66")		
3.7 m (12')		1850 mm (72")		
4 m (13')		2000 mm (78")		
4.3 m (14')		2150 mm (84")		
4.6 m (15')		2300 mm (90")		
4.9 m (16')		2450 mm (96")		
5.2 m (17')		1300 mm (52")		
5.5 m (18')		1360 mm (54")		
5.8 m (19')		1440 mm (57")		
6.1 m (20')	2	1520 mm (60")	404	
6.4 m (21')		1600 mm (63")		
6.7 m (22')		1670 mm (66")		
7 m (23')		1750 mm (69")		
7.3 m (24')		1820 mm (72")		
7.6 m (25')		1900 mm (75")		
8 m (26')		2000 mm (78")		
8.2 m (27')		2050 mm (81")		
8.5 m (28')		2120 mm (84")		
8.8 m (29')		2200 mm (87")		
9.2 m (30')		2300 mm (90")		
9.5 m (31')		2370 mm (93")		
9.8 m (32')		2450 mm (96")		
10.1 m (33')		1680 mm (66")		
10.4 m (34')		1730 mm (68")		
10.7 m (35')		1780 mm (70")		
11 m (36')	3	1830 mm (72")	175	
11.3 m (37')		1880 mm (74")		
11.6 m (38')		1930 mm (76")		
11.9 m (39')		1980 mm (78")		
12.2 m (40')		2030 mm (80")		
12.5 m (41')		2080 mm (82")		
12.8 m (42')		2130 mm (84")		
13.1 m (43')		2180 mm (86")		
13.4 m (44')		2230 mm (88")		
13.7 m (45')		2280 mm (90")		
14 m (46')		2330 mm (92")		
14.3 m (47')		2380 mm (94")		
14.6 m (48')		2430 mm (96")		
15 m (49')		1890 mm (73.5")		
15.3 m (50')		1920 mm (75.0")		
15.6 m (51')	4	1950 mm (76.5")	606	
15.9 m (52')		1980 mm (78.0")		
16.2 m (53')		2010 mm (79.5")		
16.5 m (54')		2070 mm (81.0")		
16.8 m (55')		2100 mm (82.5")		
17.1 m (56')		2160 mm (84.0")		
17.4 m (57')		2190 mm (85.5")		
17.7 m (58')		2250 mm (87.0")		
18 m (59')		2280 mm (88.5")		
18.3 m (60')		2280 mm (90.0")		
18.6 m (61')		2310 mm (91.5")		
18.9 m (62')		2340 mm (93.0")		
19.2 m (63')		2400 mm (94.5")		
19.5 m (64')		2430 mm (96.0")		

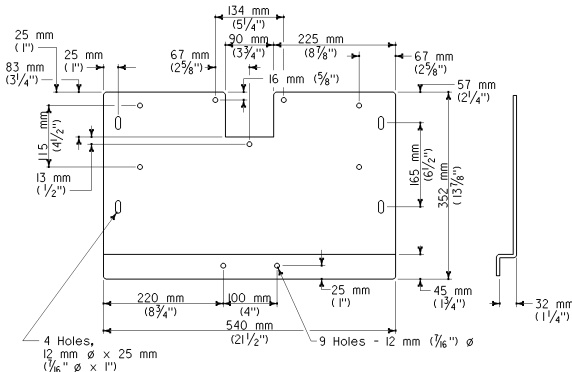


LIGHTING FIXTURE MOUNTING DETAIL (TYPICAL)

NOTES

- The number listed is the dimension from the edge of the sign panel to the center of the end-most fixture. The dimension between centers of successive fixtures shall be twice the number listed, adjusted for uniformity.
- Where adjacent sign panels are spaced 300 mm (12") or less the combination of these panels, and spaces, shall be considered a single panel.
- Physical configuration and mounting details may vary from what is shown.

CONDUIT ENTRANCE DETAIL

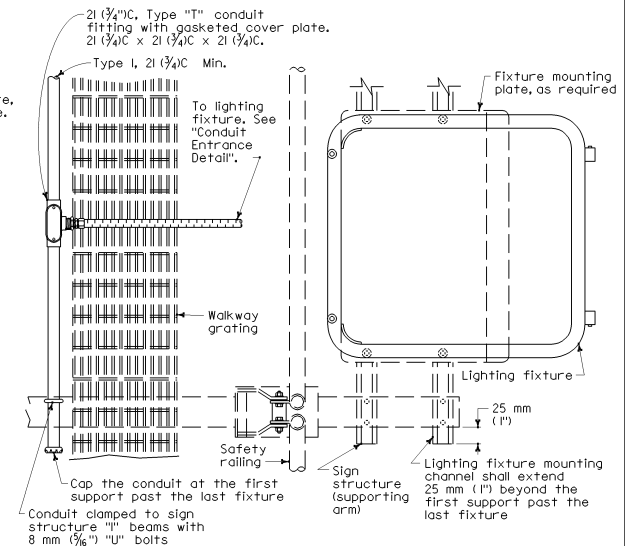


TOP VIEW

SIDE VIEW

SIGN ILLUMINATION FIXTURE MOUNTING PLATE (TYPICAL)

- Material: 3.42 mm (0.135") hot-dip galvanized sheet steel after fabrication.
- Left side is symmetrical with right side.



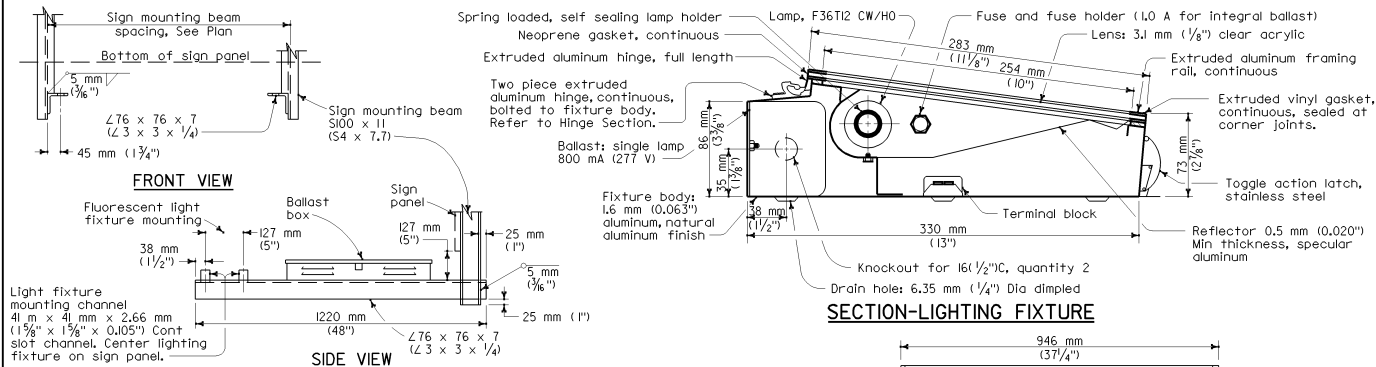
**SIGN ILLUMINATION
MERCURY VAPOR SIGN
ILLUMINATION EQUIPMENT**

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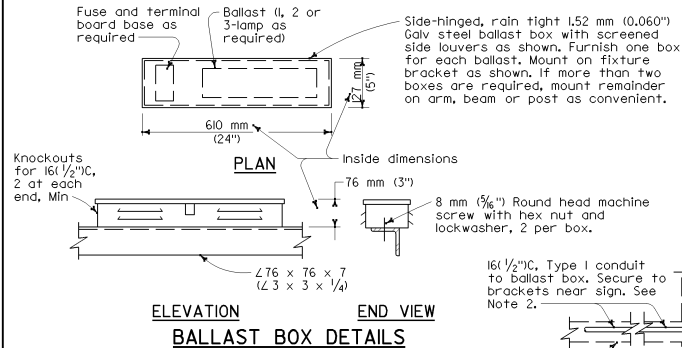
NO SCALE

ES-15A

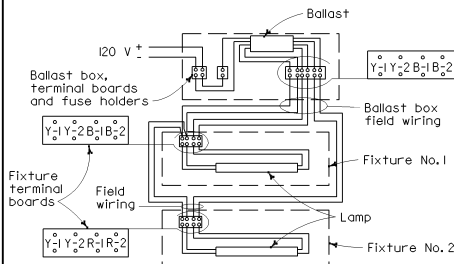
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<p>Theresa Gabriel REGISTERED PROFESSIONAL ENGINEER No. 61912-2 Exp. 6-30-04 STATE OF CALIFORNIA</p> <p>July 1, 2002 PLANS APPROVAL DATE</p> <p>The State of California or its officers or agents shall not be responsible for the accuracy or completeness or electronic copies of this plan sheet.</p> <p>Caltrans now has a web site! To get to the web site, go to http://www.dot.ca.gov</p>					



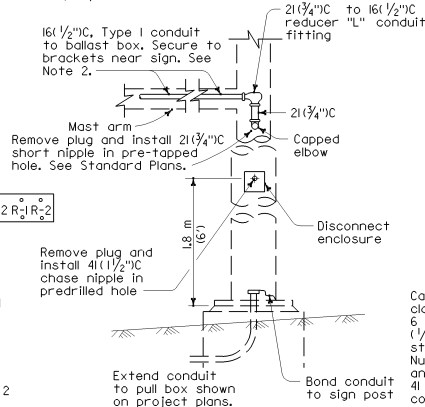
LIGHTING FIXTURE MOUNTING DETAIL (TYPICAL)



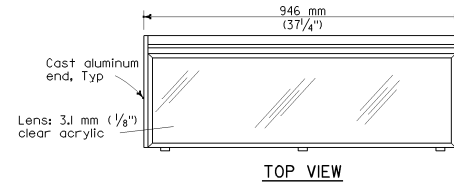
BALLAST BOX DETAILS



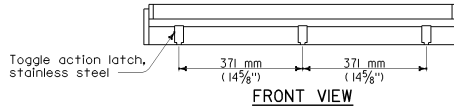
TYPICAL FIXTURE WIRING DIAGRAM (TWO LAMP)



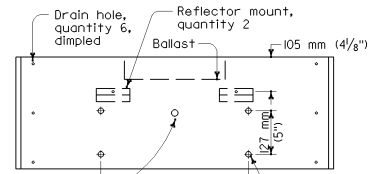
TYPICAL WIRING AND SIGN SWITCH INSTALLATION DETAILS



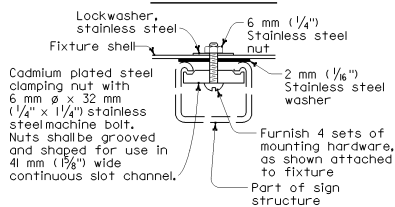
TOP VIEW



FRONT VIEW



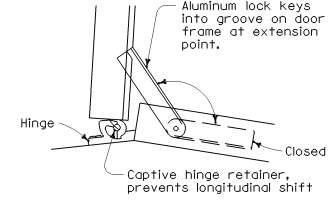
MOUNTING VIEW



DETAIL "M"

FIXTURE MOUNTING ON CONTINUOUS SLOT CHANNEL

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
<p>Theresa Gabriel REGISTERED PROFESSIONAL ENGINEER No. 151249 Exp. 6-30-04 ELECTRICAL STATE OF CALIFORNIA</p>					
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HINGE SECTION

SIGN LOAD (WATTS) AND FUSING

1 Lamp and ballast - 75 W	1 A
2 Lamps and ballast - 150 W	2.5 A
3 Lamps and ballast - 215 W	3 A

NOTES

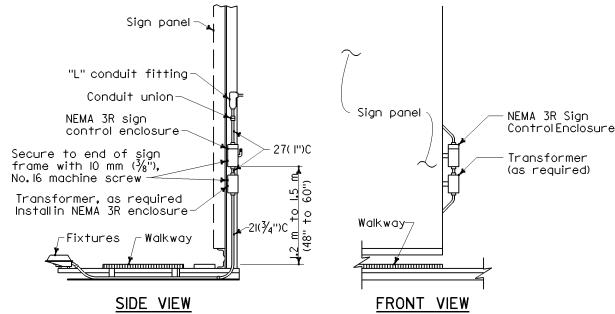
1. Wiring between ballast box and nearest fixture and between fixtures shall be run in 16 1/2" Type 4 conduit.
2. Conduit shall be secure to nearest member using one-hole galvanized malleable iron or steel straps at 1.5 m (5') maximum centers and brass machine screws tapped into the member.
3. Ballasts and terminal boards shall be marked with legible symbols. Conductors shall be tagged and their identification marked on the corresponding terminal on the terminal board as shown on the Typical Fixture Wiring Diagram. An alternative cover design shall be submitted for approval.
4. Ballast shall be one, two or three lamp types as required, rated at 800 mA.
5. Each ballast shall be fused with 32 mm x 6 mm (1 1/4" x 1/4") slow-blow glass tube fuse.
6. Fuseholder shall be a panel mounted type, with screw type finger knob.
7. At the option of the Contractor, the fixture may be supplied with an integral ballast. The ballast box will not be required when fixtures with integral ballast are supplied.

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION SIGN ILLUMINATION 915 mm (36") FLUORESCENT SIGN ILLUMINATION EQUIPMENT

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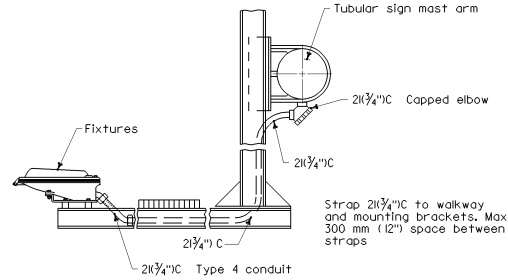
NO SCALE

ES-15B

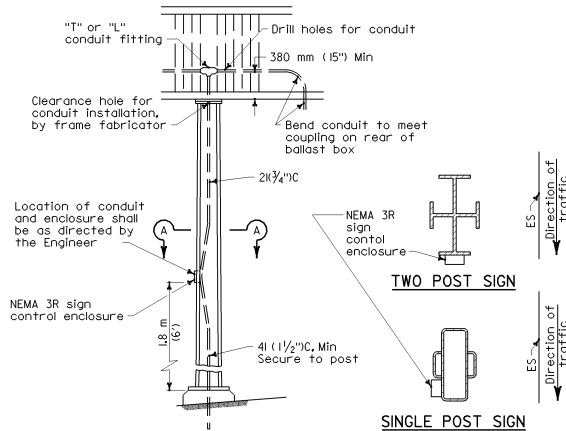


TYPICAL DETAIL
BRIDGE MOUNTED SIGN

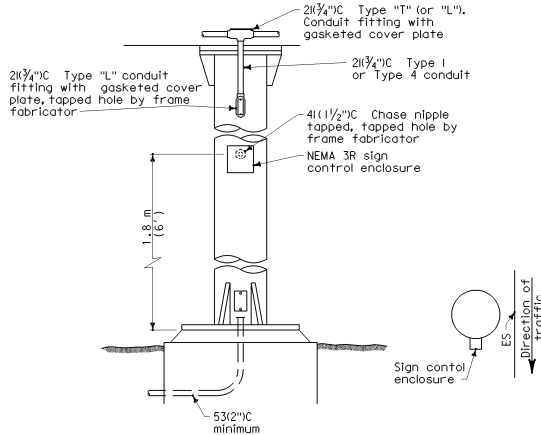
Sign control enclosure shall be readily accessible from the sign walkway.



TYPICAL CONDUIT INSTALLATION FOR
ROUND TUBULAR OVERHEAD SIGNS



SECTION A-A
TYPICAL CONDUIT AND SIGN CONTROL
INSTALLATION FOR BOX BEAM POST



TYPICAL CONDUIT AND SIGN CONTROL
INSTALLATION FOR ROUND POST

NOTES

1. Type 4 conduit shall be secured to the nearest walkway bracket using one-hole galvanized malleable iron or steel straps and brass machine screws tapped into the bracket.
2. See Standard Plans for overhead signs and frame juncture details for photoelectric unit installation.
3. Enclosures and straps shall be secured by 6 mm (1/4") maximum size screws.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
SIGN ILLUMINATION
SIGN ILLUMINATION EQUIPMENT

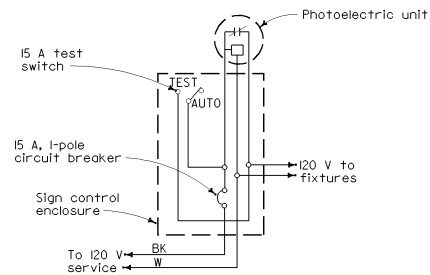
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NO SCALE

ES-15C

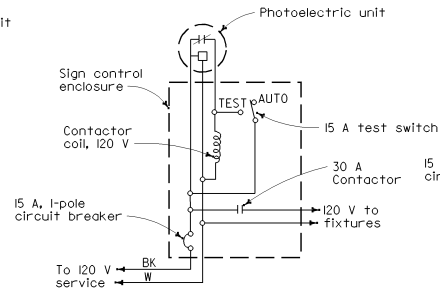
DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
<p><i>Theresa Gabriel</i> REGISTERED PROFESSIONAL ENGINEER</p> <p>July 1, 2002 PLANS APPROVAL DATE</p> <p>The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of these plans.</p> <p>California now has a web site! To get to the web site, go to: http://www.dcl.ca.gov</p>					
			<p>Theresa Gabriel No. E15129 Exp. 6-30-04 ELECTRICAL STATE OF CALIFORNIA</p>		

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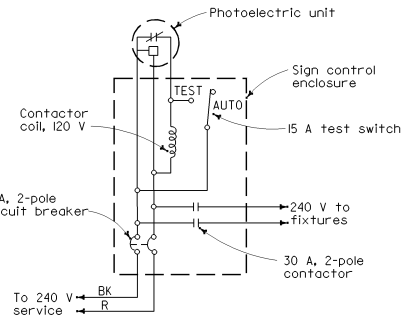
TYPE SCI SIGN CONTROL

For 120 V unswitched sign circuit with no more than 4 fixtures

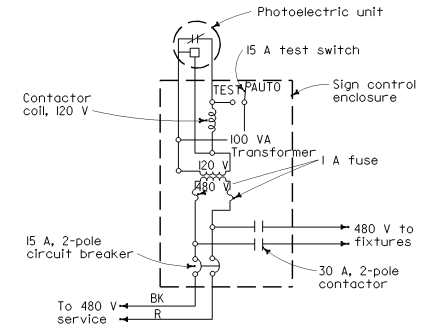


TYPE SC2 SIGN CONTROL

For 120 V unswitched sign circuit

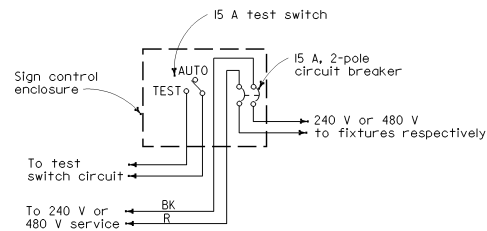


(For 240 V unswitched sign circuit)



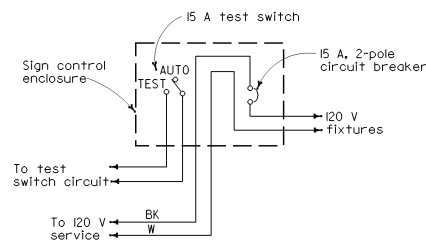
(For 480 V unswitched sign circuit)

TYPE SC3 SIGN CONTROL



TYPE SC4 SIGN CONTROL

For 240 V or 480 V switched sign circuit,
See Note 4 for Type SC4A



TYPE SC5 SIGN CONTROL

For 120 V switched sign circuit,
See Note 4 for Type SC5A

NOTES: FOR SIGN CONTROLS

1. The ballast voltages of fixtures shall match line service voltages.
2. Voltage ratings of sign control equipment shall conform to the service voltages indicated on the plans.
3. Terminal strip shall be provided for wiring to fixtures.
4. Types SC4A and SC5A are similar to Types SC4 and SC5 respectively except test switch and wiring are not required.

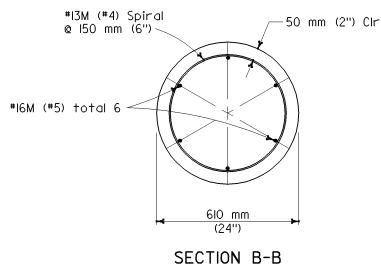
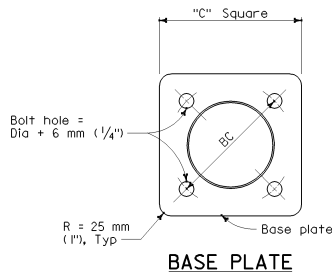
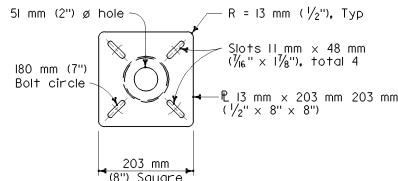
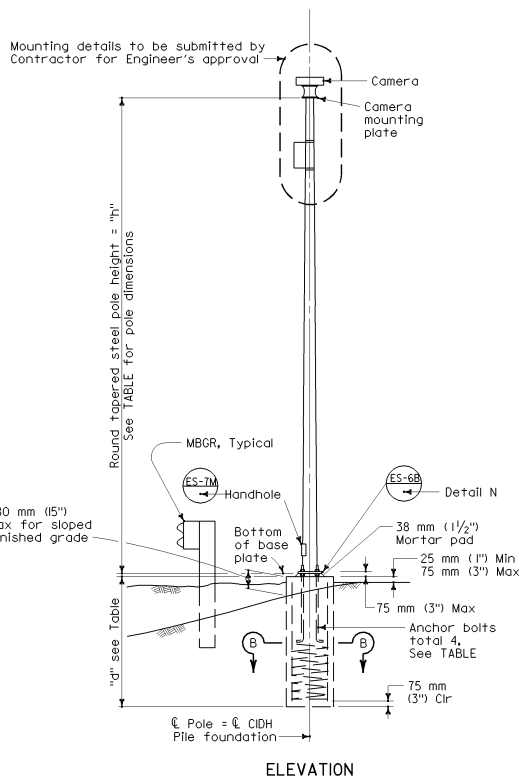
SIGN ILLUMINATION SIGN ILLUMINATION CONTROL

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NO SCALE

ES-15D

Pole Type	POLE DATA				BASE PLATE DATA					610 mm (24") CIDH Pile	Structural Steel plus 3.5% Galvanizing
	H Height	Min OD		Thickness	"C"	Thickness	Anchor Bolts				
		Base	Top				Size	BC = Bolt Circle			
CCTV 25	7.62 m (25')	187 mm (7 3/8")	98 mm (3 7/8")	4.55 mm (0.1793")	305 mm (12")	25.4 mm (1")	25 mm x 920 mm x 102 mm (1" x 36" x 4")	267 mm (10 1/2")	1.83 m (6')	180 kg (395 lbs)	
CCTV 30	9.14 m (30')	203 mm (8")					279 mm (11")	2.13 m (7')	215 kg (475 lbs)		
CCTV 35	10.67 m (35')	219 mm (8 5/8")					305 mm (12")	2.13 m (7')	250 kg (550 lbs)		
CCTV 40	12.19 m (40')	238 mm (9 3/8")					330 mm (13")	32 mm x 920 mm x 102 mm (1 1/4" x 36" x 4")	330 mm (13")	2.13 m (7')	295 kg (650 lbs)
CCTV 45	13.72 m (45')	254 mm (10")						343 mm (13 1/2")	2.44 m (8')	340 kg (750 lbs)	



GENERAL NOTES:

SPECIFICATIONS

Design: AASHTO specifications for the design and construction of structural supports for highway signs, dated 1994.

LOADING

Wind Loadings: 129 km/h (80 mph) AASHTO

UNIT STRESSES

Structural Steel: $f_y = 331 \text{ MPa}$ (48,000 psi) tapered steel tube (pole)
 $f_y = 248 \text{ MPa}$ (36,000 psi) unless otherwise noted

Anchor bolts = A307

Reinforced Concrete : $f_c = 22.4 \text{ MPa}$ (3250 psi)
 $f_y = 276 \text{ MPa}$ (40,000 psi)

NOTES:

- The Contractor shall verify all controlling field dimensions before ordering or fabricating any material.
- All steel shall be galvanized after fabrication.
- During pole erection, the post shall be raked as necessary with the use of leveling leveling nuts to provide a plumb pole axis.

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION CLOSED CIRCUIT TELEVISION POLE DETAILS

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NO SCALE

ES-16A

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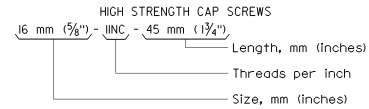
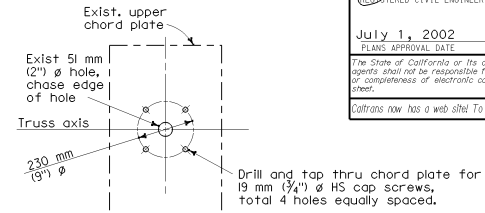
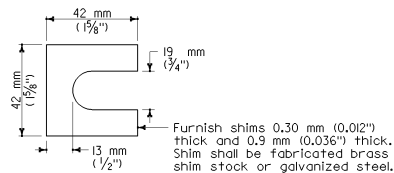
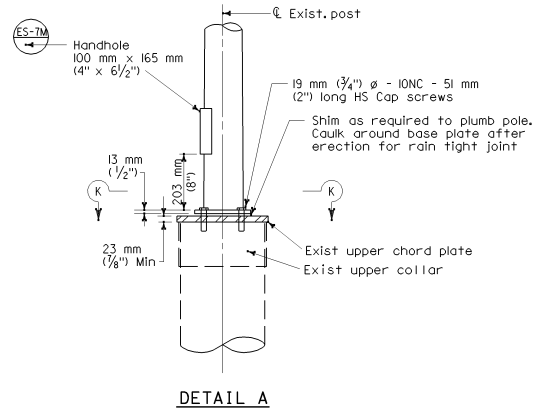
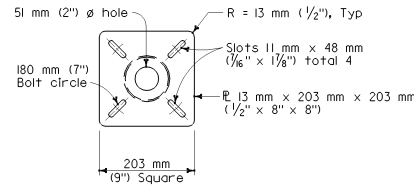
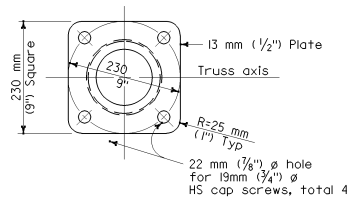
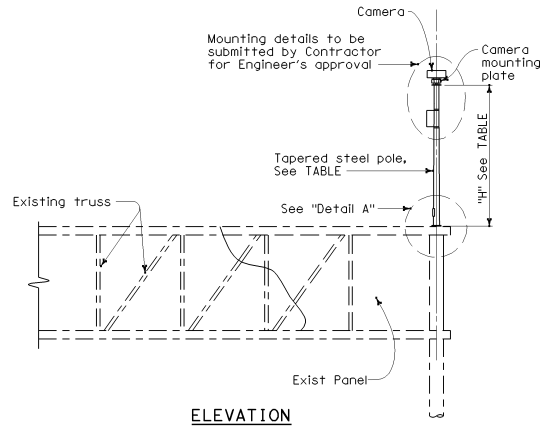
Signature: *Jeffrey S. Woody*
REGISTERED CIVIL ENGINEER
No. C41260
EXPIRATION DATE 3-31-03
STATE OF CALIFORNIA

PLANS APPROVAL DATE
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Pole Type	POLE DATA			
	H Height	Min OD		Thickness
		Base	Top	
CCTV 5	1.5 m (5')	116 mm (4 5/8")		
CCTV 10	3.0 m (10')	133 mm (5 1/4")	98 mm (3 7/8")	4.55 mm (0.1793")
CCTV 15	4.5 m (15')	151 mm (5 9/16")		



GENERAL NOTES:

SPECIFICATIONS

Design: AASHTO specifications for the design and construction of structural supports for highway signs, dated 1994.

LOADING

Wind Loadings: 129 km/h (80 mph) AASHTO

UNIT STRESSES

Structural Steel: $f_y = 331 \text{ MPa}$ (48,000 psi) tapered steel tube (pole)
 $f_y = 248 \text{ MPa}$ (36,000 psi) unless otherwise noted

NOTES:

- The Contractor shall verify all controlling field dimensions before ordering or fabricating any material.
- All steel shall be galvanized after fabrication.
- Bolt hole locations may vary at the discretion of the Engineer.

CLOSED CIRCUIT TELEVISION POLE DETAILS - OVERHEAD SIGN MOUNTED

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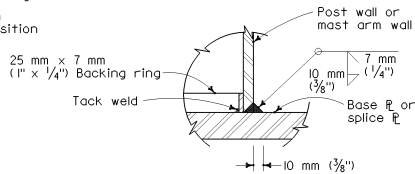
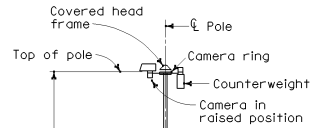
ES-16B

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

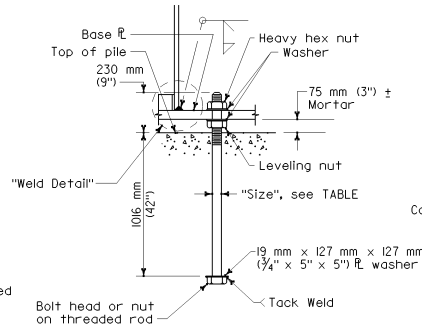
Registered Civil Engineer
 Jeffrey S. Woody
 No. C41260
 State of California
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Pole Type	H Height	POLE DATA			BASE PLATE DATA				CIDH PILE DATA		
		Min OD	Base	Top	Thickness	Dia	Thickness	Anchor Bolts	Dia	"d"	Pile Reinf
CCTV 90	27.4 m (90')	610 mm (24")	281 mm (11 1/8")	4.55 mm	914 mm (36")	51 mm	51 mm	737 mm (29")	1067 mm	3.6 m (12")	15 - #22M (#7)
CCTV 80	24.3 m (80')	559 mm (22")	256 mm (10 1/8")	4.55 mm	864 mm (34")	51 mm	51 mm	686 mm (27")	1067 mm	3.3 m (11")	
CCTV 70	21.3 m (70')	508 mm (20")	260 mm (10 3/4")	4.55 mm	813 mm (32")	51 mm	51 mm	635 mm (25")	1067 mm	3.0 m (10")	
CCTV 60	18.2 m (60')	457 mm (18")	248 mm (9 3/4")	4.55 mm	762 mm (30")	51 mm	51 mm	584 mm (23")	1067 mm	2.7 m (9")	

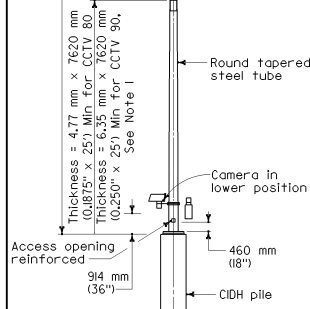
*Lower pole segment thickness, see Pole Details



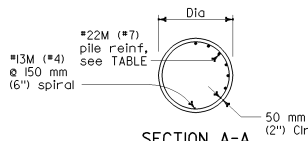
WELD DETAIL



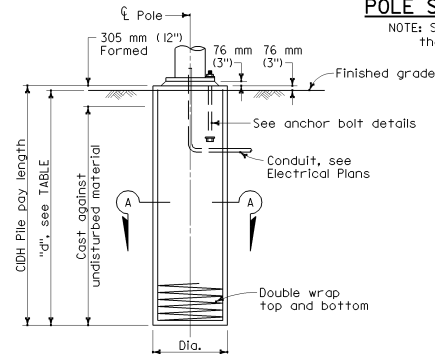
ANCHOR BOLT DETAIL



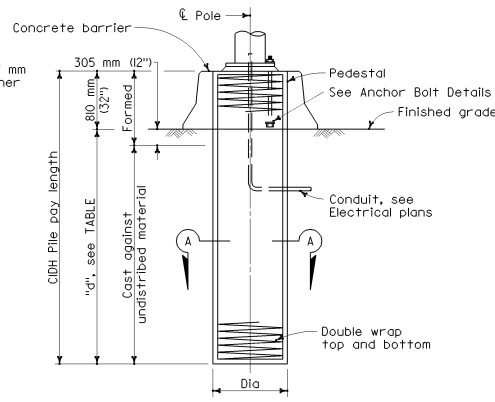
POLE DETAILS



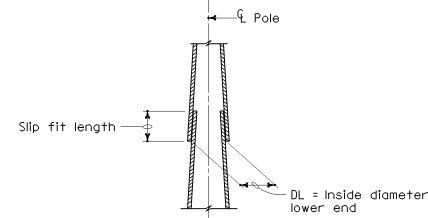
**SECTION A-A
CIDH PILE DETAILS**



TYPICAL ELEVATION

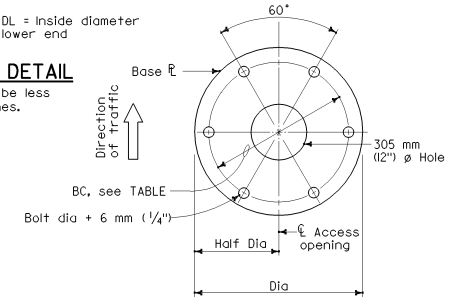


MEDIAN LOCATION



POLE SEGMENT SPLICE DETAIL

NOTE: Slip fit length shall not be less than 1.5 DL minus two inches.



BASE PLATE DETAILS

GENERAL NOTES:

SPECIFICATIONS

Design: AASHTO specifications for the design and construction of structural supports for highway signs, dated 1994.

LOADING

Wind Loadings: 129 km/h (80 mph) AASHTO

UNIT STRESSES

Structural Steel: f_s = Maximum allowed for design of tapered steel tube (pole) to be 379 MPa (55,000 psi).

NOTES:

1. Pole details shall suit the lowering device and this foundation plan. Pole details shall be submitted to the Engineer for approval.
2. Pole finishes shall be galvanized.
3. For camera details, See Electrical Plans.
4. Foundation design is based on a maximum wind velocity of 129 km/h (80 mph).

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION CLOSED CIRCUIT TELEVISION 18.2 m TO 27.4 m (60' TO 90') HIGH MAST POLE FOUNDATION DETAILS

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NO SCALE

ES-16C

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